SEVENTH FRAMEWORK PROGRAMME
THEME 9
Space

Grant agreement for: **Collaborative Project**

Annex I - "Description of Work"

Project acronym: **G-MOSAIC**
Project full title: **G**mes Services for **M**anagement of **O**perations, **S**ituation **A**wareness and **I**ntelligence for regional **C**rises
Grant agreement no.: **218822**
Date of preparation of Annex I: **30/09/2008**
Date of approval of Annex I by Commission: 12/11/2008

List of Beneficiaries

Beneficiary Number	Beneficiary Name	Beneficiary Short name	Country	Date enter project	Date exit project
1	Telespazio	TPZ	I	1	36
2	Infoterra France	Infoterra France	F	1	36
3	Thales Communications SA	TCF	F	1	36
4	Deutsches Zentrum fur luft und Raumfahrt e.V.	DLR	D	1	36
5	Indra Espacio S.A.	INDRA ESPACIO	E	1	36
6	GMV Aerospace & Defence	GMV	E	1	36
7	European Union Satellite Centre	EUSC	Int	1	36
8	Joint Research Centre	JRC	Int	1	36
9	Space Research Centre Polish Academy of Sciences (Centrum Badan Kosmicznych Polska Akademia Nauk)	SRC	PL	1	36
10	Istituto Affari Internazionali	IAI	I	1	36
11	Fondation pour la Recherche Stratégique	FRS	F	1	36
12	Satelitarne Centrum Operacij Regionalnych	SCOR	PL	1	36
13	Thales Alenia Space Italia S.p.A.	TAS-I	I	1	36
14	Thales Alenia Space France	TAS-F	F	1	36
15	Arsenale Novissimo	AN	F	1	36
16	Astrium SAS	Astrium SAS	F	1	36
17	Infoterra UK Ltd	Infoterra UK	GB	1	36
18	Infotera GmbH	ITD	D	1	36
19	Technische Universitaet Bergakademie Freiberg	TUBAF	D	1	36
20	Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO	TNO	NL	1	36
21	Consiglio Nazionale delle Ricerche	IMAA	I	1	36
22	Università degli Studi della Basilicata	UNIBAS	I	1	36
24	Eurosense Belfotop N.V.	EUROSENSE	B	1	36
26	Luiss Livera Università internazionale degli studi sociali Guido Carli	LUISS	I	1	36
27	Skysoft Portugal, Software e Tecnologias de informaçao, S.A.	SKF	P	1	36
28	Instituto Superior Técnico	IST	P	1	36
29	Joanneum Research Forschungsgesellschaft m.b.H.	JR	A	1	36
30	Paris London University Salzburg (Universitaet Salzburg)	PLUS	A	1	36
32	Planetek Italia s.r.l.	PLANETEK	I	1	36
33	Centro di Ricerca Progetto San Marco- Sapienza Università di Roma (Università degli studi di Roma la Sapienza)	CRPSM	I	1	36
34	GISAT s.r.o.	GISAT	CZ	1	36
35	King's College London	KCL	GB	1	36
36	SYNESYS	SYNESYS	F	1	36
37	Adelphi Research GGmbH	Adelphi	D	1	36
39	Sistematica S.p.A.	SISTEMATICA	I	1	36
40	Swiss Peace Foundation	Swisspeace	CH	1	36

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Executive Summary

Within the context of GMES Initiative, G-MOSAIC Collaborative Project aims at **identifying and developing products, methodologies and pilot services** for the provision of geo-spatial information in support of EU external relations policies and at contributing to define and demonstrate **sustainability of GMES global security** perspective.

In particular the activities will be devoted to:

- Investigate the operational exploitation of GMES services and concepts as assets supporting security related activities, focusing on External Regional Crises Situations;
- Contribute to identification of Core and Downstream geo-spatial intelligence Services, within the framework of current status of GMES Initiative;
- Disseminate the knowledge on GMES potential impact on Security related User Community,
- Contribute to build a political consensus on GMES Services for Security, to promote the construction of a European inter-pillar capability for the monitoring services and related infrastructures;
- Assess a sustainable provision and funding model for GMES Security Services;
- Study architectural models and prototype suitable solutions for security services provision, addressing specific requirements related to confidentiality of sensitive data and information handling;
- Provide recommendations for next sensors for security services.

Reference Users are: DG-RELEX (and DG-Development, DG-ECHO, DG-Environment, etc.); Council Entities such as EU Military Staff, Situation Centre; National Institutions such as Ministries of Foreign Affaires, Police Offices, Intelligence Centres, etc.

The proposed service cases, built together with the reference users, will support Situation Awareness and Intelligence applications, and Crisis Management Operations.

In the first domain, the deployed services provide information on major Threat Warning Factors (such as illegal activities and critical assets monitoring, WMD proliferation control, crisis indicators assessment, extended routes surveillance); these information can contribute in understanding where, outside of Europe, Regional Crises (such as state failure, ethnic conflicts, government instability) have high probability to occur.

In the second domain, for identified Crisis Scenarios, the deployed services support the intervention activities: crisis planning (or preparedness), crisis management, damage assessment, reconstruction and resilience.

A. Budget breakdown and project summary

A.1 Overall budget breakdown for the project

Participant ID	Participant	RTD / Innovation (A)	Demonstration (B)	Management (C)	Other (D)	Total (A+B+C+D)	Total receipts	Requested EC contribution
1	TPZ	2.302.409,00 €		655.330,00 €	150.423,00 €	3.108.162,00 €		1.956.957,00 €
2	INFOTERRA FRANCE	581.468,00 €		- €	- €	581.468,00 €		290.734,00 €
3	TCF	1.234.923,00 €		2.500,00 €	- €	1.237.423,00 €		619.962,00 €
4	DLR	832.443,00 €		2.500,00 €	- €	834.943,00 €		626.832,00 €
5	INDRA ESPACIO	1.170.062,00 €		2.500,00 €	- €	1.172.562,00 €		587.531,00 €
6	GMV	787.500,00 €		2.500,00 €	- €	790.000,00 €		396.250,00 €
7	EUSC	835.552,00 €		- €	95.738,00 €	931.290,00 €		722.402,00 €
8	JRC	730.886,00 €		- €	54.720,00 €	785.606,00 €		602.885,00 €
9	SRC	293.445,00 €		- €	- €	293.445,00 €		220.084,00 €
10	IAI	146.667,00 €		- €	- €	146.667,00 €		110.000,00 €
11	FRS	120.000,00 €		- €	- €	120.000,00 €		90.000,00 €
12	SCOR	178.200,00 €		- €	- €	178.200,00 €		89.100,00 €
13	TAS-I	434.160,00 €		- €	- €	434.160,00 €		217.080,00 €
14	TAS-F	135.635,00 €		- €	- €	135.635,00 €		67.817,00 €
15	AN	222.000,00 €		- €	120.000,00 €	342.000,00 €		286.500,00 €
16	Astrium SAS	275.454,00 €		- €	- €	275.454,00 €		137.727,00 €
17	Infoterra UK	730.552,00 €		2.500,00 €	- €	733.052,00 €		367.776,00 €
18	ITD	453.456,00 €		- €	- €	453.456,00 €		226.728,00 €
19	TUBAF	84.000,00 €		- €	- €	84.000,00 €		63.000,00 €
20	TNO	184.714,00 €		- €	- €	184.714,00 €		138.536,00 €
21	IMAA	113.724,00 €		- €	- €	113.724,00 €		85.293,00 €
22	UNIBAS	84.000,00 €		- €	- €	84.000,00 €		63.000,00 €
24	EUROSENSE	180.000,00 €		- €	- €	180.000,00 €		135.000,00 €
26	LUISS	140.710,00 €		- €	- €	140.710,00 €		105.532,00 €
27	SKF	297.000,00 €		- €	- €	297.000,00 €		148.500,00 €
28	IST	120.594,00 €		- €	- €	120.594,00 €		90.445,00 €
29	JR	120.262,00 €		- €	- €	120.262,00 €		90.196,00 €
30	PLUS-Z_GIS	232.494,00 €		- €	- €	232.494,00 €		174.371,00 €
32	PLANETEK	166.667,00 €		- €	- €	166.667,00 €		125.000,00 €
33	CRPSM	123.840,00 €		- €	- €	123.840,00 €		92.880,00 €
34	GISAT	205.056,00 €		- €	- €	205.056,00 €		153.792,00 €
35	KCL	191.952,00 €		- €	- €	191.952,00 €		143.964,00 €
36	SYNESYS	133.736,00 €		- €	- €	133.736,00 €		100.302,00 €
37	Adelphi	219.477,00 €		- €	- €	219.477,00 €		164.608,00 €
39	SISTEMATICA	75.622,00 €		- €	- €	75.622,00 €		56.716,00 €
40	Swisspeace	70.000,00 €		- €	- €	70.000,00 €		52.500,00 €
Total		14.208.660,00 €	- €	667.830,00 €	420.881,00 €	15.297.371,00 €	- €	9.600.000,00 €

Table A-1: Overall budget breakdown

A.2 Project summary

Project Number 1	218822	Project Acronym 2	G-MOSAIC

ONE FORM PER PROJECT

GENERAL INFORMATION			
Project title	G-MOSAIC GMES services for Management of Operations, Situation Awareness and Intelligence for regional Crises		
Starting date	The first day of the month after the signature by the Commission		
Duration in months	36		
Call (part) identifier	FP7-SPACE-2007-1		
Activity code(s) most relevant to your topic	SPA-2007-1.1-02: Developing pre-operational GMES pilot services in new application fields		
Free keywords		Crisis management, GMES, Security, geo-spatial intelligence, crisis indicators, regional crises, threat warning factors	

Abstract 9 (max. 2000 char.)

Within the context of the GMES Initiative, the G-MOSAIC Collaborative Project aims at identifying and developing products, methodologies and pilot services for the provision of geo-spatial information in support of EU external relations policies and at contributing to define and demonstrate sustainability of GMES global security perspective. The activities will be devoted to:

- Investigate the operational exploitation of GMES services as assets supporting security related activities on External Regional Crises Situations;
- Contribute to identify the Core and Downstream geo-spatial intelligence Services, in the framework of current status of GMES Initiative;
- Disseminate the knowledge on GMES potential impact on Security related User Community;
- Contribute to build a political consensus on GMES Services for Security; promote the construction of a European inter-pillar capability for the monitoring services and infrastructures;
- Assess a sustainable provision and funding model for GMES Security Services; provide recommendations for next sensors for security services.

Reference Users are: DG-RELEX (and DGs Development, ECHO, Environment, etc.); Council Entities: EU Military Staff, Situation Centre; National Institutions: Ministries of Foreign Affaires, Intelligence Centres.

The proposed service cases, built with the reference users, will support Situation Awareness and Intelligence applications and Crisis Management Operations.

In the first domain, the deployed services provide information on major Threat Warning Factors (illegal activities, critical assets monitoring, WMD proliferation control, crisis indicators assessment, extended routes surveillance); these products contribute to understand where, outside of Europe, Regional Crises (state failure, ethnic conflicts, government instability) can occur.

In the second domain, for identified Crisis Scenarios, the deployed services support the intervention activities: crisis planning and management, damage assessment, reconstruction and resilience.

Table A-2: Project summary

A.3 List of beneficiaries

Beneficiary Number	Beneficiary Name	Beneficiary Short name	Country
1	Telespazio	TPZ	I
2	Infoterra France	INFOTERRA FRANCE	F
3	Thales Communications SA	TCF	F
4	Deutsches Zentrum fur luft und Raumfahrt e.V.	DLR	D
5	Indra Espacio S.A.	INDRA ESPACIO	E
6	GMV Aerospace & Defence	GMV	E
7	European Union Satellite Centre	EUSC	Int
8	Joint Research Centre	JRC	Int
9	Space Research Centre Polish Academy of Sciences (Centrum Badan Kosmicznych Polska Akademia Nauk)	SRC	PL
10	Istituto Affari Internazionali	IAI	I
11	Fondation pour la Recherche Stratégique	FRS	F
12	Satelitarne Centrum Operacij Regionalnych	SCOR	PL
13	Thales Alenia Space Italia S.p.A.	TAS-I	I
14	Thales Alenia Space France	TAS-F	F
15	Arsenale Novissimo	AN	F
16	Astrium SAS	Astrium SAS	F
17	Infoterra UK Ltd	Infoterra UK	GB
18	Infotera GmbH	ITD	D
19	Technische Universitaet Bergakademie Freiberg	TUBAF	D
20	Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO	TNO	NL
21	Consiglio Nazionale delle Ricerche	IMAA	I
22	Università degli Studi della Basilicata	UNIBAS	I
24	Eurosense Belfotop N.V.	EUROSENSE	B
26	Luiss Livera Università internazionale degli studi sociali Guido Carli	LUISS	I
27	Skysoft Portugal, Software e Tecnologias de informaçao, S.A.	SKF	P
28	Instituto Superior Técnico	IST	P
29	Joanneum Research Forschungsgesellschaft m.b.H.	JR	A
30	Paris London University Salzburg (Universitaet Salzburg)	PLUS	A
32	Planetek Italia s.r.l.	PLANETEK	I
33	Centro di Ricerca Progetto San Marco - Sapienza Università di Roma (Università degli studi di Roma la Sapienza)	CRPSM	I
34	GISAT s.r.o.	GISAT	CZ
35	King's College London	KCL	GB
36	SYNESYS	SYNESYS	F
37	Adelphi Research GGmbH	Adelphi	D
39	Sistematica S.p.A.	SISTEMATICA	I
40	Swiss Peace Foundation	Swisspeace	CH

B. Part B

B.1 Concept and objectives, progress beyond state-of-the-art, S/T methodology and work plan

B.1.1 Concept and objectives

B.1.1.1 G-MOSAIC main objective and expected results

Within the context of the GMES initiative, G-MOSAIC Collaborative Project aims at **identifying and developing products, methodologies and pilot services** for the provision of geo-spatial information in support of EU external relations policies and at contributing to define and demonstrate **sustainability of GMES global security** perspective.

In particular, G-MOSAIC services will support the prevention and management of external Regional Crisis (and the relevant EU intervention) for, e.g. peace keeping, peace enforcing, crisis prevention, EU citizens rescue. External Regional Crisis can be regarded, in fact:

- as an indirect threat to Europe, given the fact that they can likely scale up to a global dimension,
- as a direct emergency for European citizens living, working or visiting the involved nations,
- as an issue for Europe as global player in building a better and peaceful world.

The main **expected results** of the proposed project are:

New GMES services for security

- Organize service chains and infrastructure for the provision of pre-operational pilot services in support of security activities, in particular focusing on External Regional Crises
- Develop pre-operational Core Services for Security, and identify related Downstream Services, based on what was developed in previous GMES security and emergency response projects
- Develop a prototype portal for the management and harmonization of the different service cases in a secure service network

New users involvement

- Disseminate the knowledge on GMES potential impact on Security related User Community, and to contribute to build a political consensus on GMES Services for Security
- Promote the construction of a European inter-pillar capability for the monitoring services and related infrastructures
- Directly involve users in scenarios definition, to be continuously updated based on feedback collection, in order to guarantee the integration of geo-information supplied into their workflow and decision making process

Contribution to GMES sustainability

- Assess a sustainable provision and funding model for GMES Security Services
- Derive recommendations for the development of the GMES Earth Observation space component
- Study architectural models and prototype suitable solutions for security services provision, addressing specific requirements related to confidentiality of sensitive data and information handling

GMOSAIC will develop services in order to:

1. **Support intelligence and early warning,** with the objective to deploy and validate those information services that contribute to the analysis of the causes leading to regional crises, such as the evaluation of synthetic crisis indicators, the monitoring of critical assets, borders, routes, proliferation and illegal activities and their relations to regional crises.
2. **Support Crisis Management Operations**, with the objective to deploy and validate those information services, that contribute to support the planning for EU intervention during crises, the EU intervention and citizen repatriation during crises, the crisis consequences management, reconstruction & resilience.

B.1.1.2 EU security context analysis

In recent years European Union has become increasingly aware of its security environment as it has taken on a growing international profile such as in relation to negotiations with Iran or in regional crisis management operations from the Balkans, Indonesia, and the Democratic Republic of Congo (DRC). Since the nineties, the European Union's institutions have engaged in the difficult task of defining the security missions that may confront Europe. In 1992 the Petersberg declaration, further confirmed by the Amsterdam Treaty in 1997, identified the following tasks to include:

- Humanitarian relief and rescue;
- Peacekeeping;
- Crisis management, including peacemaking.

The late nineties saw additional work progress in the area of security and conflict prevention, among others by establishing the first Conflict Prevention Network (CPN). The treaty of Nice adopted by the Council in December 2000 created permanent political and military structures, referring to a Political and Security Committee made up of member States representatives, new "2010 Headline Goal" was endorsed in June 2004, adding enlarged missions, including notably:

- Joint disarmament operations
- Support brought to third countries in combating terrorism
- The security sector reform
- Border control
- Demobilisation and reintegration

A particular accent was put on the necessity for the European Union Member States to be able "to act before a crisis occurs", underlining the necessity to possess the relevant information tools for political and military monitoring. The need for conflict prevention was re-emphasised in the EU Commission's 2001 Communication on Conflict Prevention [R3]. Shortly thereafter in 2003 the European Security Strategy (ESS) was adopted by the European Council [R4, R5]. It outlines a diverse range of threats, clustered into five major security threats:

- Terrorism
- Proliferation of weapons of mass destruction (WMD)
- Regional conflicts
- State Failure
- Organised Crime

Beyond these five key threats, the ESS further contemplates upcoming challenges, among them increased competition for water and other natural resources due to global warming, which will create further turbulence and migratory movements. In addition, the threat of proliferation of WMD let the Council to adopt a separate strategy dedicated to combating their proliferation [R6].

Since then, several key European documents have been presented, further spelling out the parameters of the ESS.

Among these, a report, made public by the European Space Agency (ESA) in October 2006, points at severe lacks affecting the information-gathering process as reported by a panel of defence and security user communities [R8]. Decisive improvements will have to be made in the field of data collection and processing, data transmission capabilities and integrated tools mixing Earth Observation, mapping, telecommunication and navigation techniques [R9].

In the field of security, a Group of Personalities set up by the European Commission and supported by the High representative for CFSP established a list of security threats for the European citizen and recommended increasing the security research in fields such as:

- Protection of critical infrastructures
- Border control
- Civil Defence/protection
- Disaster management
- Law enforcement against trafficking
- Treaty verification

The development of related capabilities in the following domains is mentioned to deal with those threats:

- Intelligence means
- Assessment and analysis means
- Surveillance capabilities (for maritime security, border control or critical sites protection)
- Secured communications capabilities [R8]

A Preparatory Action in the field of Security Research (PASR) launched in 2004 by the European Commission and supported by a European Security Research Advisory Board (ESRAB) has confirmed these security needs [R9] and resulted in a larger share of the 7th Framework Programme for R&D devoted to the security research.

Concerning external regional crises, the EU Programme for Prevention of Violent Conflicts, endorsed by EU Council in 2001 [R10], underlines the EU's political commitment to pursue conflict prevention as one of the main objectives of the EU's external relations. Among the most recently established instruments are the new Instrument for Stability (IfS) [R11] for response to crisis and emerging crisis as well as providing stability support measures, including a special facility on natural resources and conflict. The IfS is thereby complemented by the second CPN as well as the upcoming Peace-building Partnership.

In conclusion, it is recognised that the "out of area" crisis scenarios, which are the subject of G-MOSAIC services application scenarios, are a focus point for European security.

B.1.1.3 Addressed Geographical Areas: Africa and the broader Middle East

To enhance policy relevance, G-MOSAIC will address regions which are already high priority regions for the EU. The primary geographical focus will thereby be on Africa, while the secondary focus will be laid on parts of the wider European neighbourhood, including the 'broader Middle East', reaching from North Africa to the Afghan/Pakistan frontier as well Eastern Europe and the Southern Caucasus.

The selection is based on three criteria: First, their relative proximity to Europe and the security threats they pose; second, their overlap and coalescing with the European neighbourhood; third, preliminary interviews with potential end users of the EU and its Member States.

Regarding Africa, there are not only strong historical ties between Europe and Africa, but also common interests of both continents: no development can take place without peace and security, not to mention achieving the Millennium Development Goals. While Africa has made substantial progress in this regard, several mutually re-enforcing challenges remain:

- The Central and Eastern parts of Africa, stretching from the Horn of Africa over Sudan to the Great Lakes region continue to experience armed violence and instability. Beyond the immediate humanitarian tragedy, refugee streams and conflict spill over as in case of Sudan/Chad continue to destabilise neighbouring and even more distant states.
- Governance deficits and limited or failed statehood has created ample opportunities for non-state actors to illegally exploit natural resources and trafficking weapons and other goods. Beyond financing organised crime and armed factions, this situation re-enforces corruption and thus inhibits development and the promotion of good governance. Such 'stateless' zones are used as retreat or transit-hubs for non-state actors including terrorist organisations and serve as breeding grounds for future conflicts threatening development.

- However, also several states, such as those located in the Mano River Basin, have just emerged from violent conflict and re-started development. Still, while progressing well so far, experience show that post-conflict situations are fragile and prone to deteriorate. In case of re-erupting of conflicts, the resulting violence may easily again drag neighbouring states into the conflict.
- Livelihood insecurity resulting from scarce natural resources, environmental degradation and governance deficits in delivering basic services remains a key concern in many areas. It makes communities susceptible to crisis and fosters migratory movements to cities, other countries, and continents putting stress on host communities. The lack of statehood in many (border) areas creating permissible conditions in the first place is thereby indicative for a deficit in coping capacity of such processes.
- Climate change is likely to exacerbate existing livelihood insecurities and may overtax current capacities for adaptation of several states. Coupled with expected high population growth, this can result in increased competition for scarce natural resources as well as increased environmental migration resulting in increased susceptibility to crisis even of the stable regions of Africa.

Similar challenges as in Africa can also be identified within the broader Middle East. In particular, the lack of statehood in Afghanistan and at the Afghan/Pakistani frontier makes an excellent retreat for terrorist organisations and trafficking operations. However, the challenges of limited statehood are also identifiable in countries such as Iraq and the internal power struggles Lebanon is suffering with both already having in form of trans-national refugee streams and terrorist activity become potential epicentres of regional crisis. The already tense domestic situations and regional relations of the Middle East are further strained by the (nuclear) ambitions and alleged pursuit of WMD, while population growth and climate change will strongly exacerbate the competition over scarce natural resources, water in particular. As the EU is furthermore still dependent on oil from the region, instability, even when not having direct negative impacts on the EU, will have repercussion for European energy security.

A similar claim can be made for the east European neighbourhood including Ukraine Moldova and the Southern Caucasus, where critical pipelines are vital for Europe's energy security. The region is marred with a number of currently frozen territorial conflicts and unresolved political disputes which continue to have destabilising effects. Furthermore, the region remains a major transit hub for illegal migration and drug and arms trafficking. Similar to Africa, such activities strengthen criminal networks and continue to undermine state institutions and also fund terrorist activities such as the ongoing insurgency in Afghanistan. Increased stability in this area may therefore also have positive spill-over effect to the neighbours of Europe's neighbours.

Beyond the individual threat potential, the three regions overlap and coalesce within the European neighbourhood. This merging may have a mutually aggravating effect: An influx of migrants and refugees having the potential to destabilise the already resource-scarce North Africa/Near East region even further. Criminal and terrorist networks become interlinked which facilitates trafficking in drugs, arms and human beings. Together, these processes may contribute in creating and maintaining a corona of fragile statehood around Europe thwarting the ideas and objectives of the European Neighbourhood Policy

Comprehensive early warning and monitoring is therefore of key importance to manage and defuse potential threats and will be vital to prevent spill-over effects on and direct negative impacts to Europe.

The integrated service chains of G-MOSAIC may provide for comprehensive information, not least because of its ability to monitor difficult areas or those where statehood has effectively ceased. It may provide integrated analysis incorporating a variety of data tackling the multitude of mutually re-enforcing causes of conflict to inform decisions concerned with conflict prevention, crisis management and sustainable peace-building. In particular, it will enhance the effectiveness of the IfS by allowing identification of areas in need of early stabilising actions and crisis diffusion.

B.1.1.4 G-MOSAIC concept

The G-MOSAIC project will tackle the above overviewed scenarios, in terms of GMES services applied to the prevention and to the management of crises. This program represent a further step into the development of GMES services, building-upon results of existing projects such as LIMES (this IP is developing services demonstrations, in a "cluster" approach, for homeland and border control security, as well as support to outside EU intervention for the management of supply of Humanitarian relief.

G-MOSAIC will specifically develop the integration of services in order to support external crisis scenarios: from intelligence and early warning phase, to preparedness, crisis management and reconstruction phase.

G-MOSAIC Project is based on the following main concepts:

Build new services for new operational scenarios by using GMES capabilities already developed in different application fields

- Up to date, GMES Initiative has been producing a quite large portfolio of basic building blocks for EO based information services provision: using the available EO data sources and those building blocks, a wide set of "state-of-the-art" products, services, have been implemented, tested and are now going to pre-operational validation (GMES Supply); these basic products\services have been developed for Land, Marine, Emergency application fields.

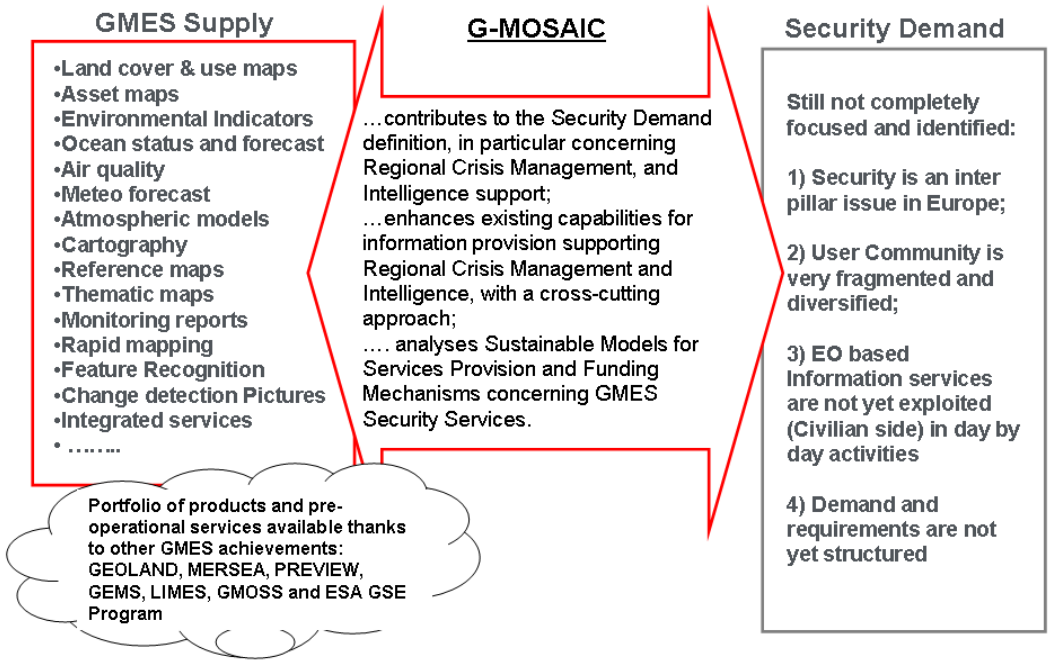

Fig. B-1: Innovative exploitation of GMES capabilities for Security Needs

Complexity of Requested Information Services Supporting Security tackled with two levels of integration

- As already highlighted by other on-going GMES and Security initiatives (MARISS, LIMES, GMOSS, Astro+), EO based Information Services supporting Security related activities, require a deep integration, due to the intrinsic complementarities, with other data and information sources, and can be fully exploited only if a big effort is put in designing service chains fully integrated with other information infrastructures, methodologies, etc. In addition, key users of these services are at the political and diplomatic level and therefore EO derived geo-spatial information has to be integrated with socio-economical data, geo-referenced unstructured information (about threats and events) and political context analysis (based on human expert value added).

"Intelligent Mapping": the GMES contribution to External Crises Management

- In the generation of global human crises a wide range of parameters, phenomena, complex feedback mechanisms are involved. Therefore, the requested information tools and means supporting the activities of decision makers, experts, politicians, operational bodies, are more and more effective and efficient as much as they integrate and correlate heterogeneous products (maps, graphics, socio-economic data, news, etc.) in dynamic tools; indeed, Users need not only to browse such complex

information, but also to interactively "manipulate" them by locally operating analysis and decision making tools and adding elements and information not accessible to service providers (e.g. confidential or classified).

The Mosaic of heterogeneous multi-colour tiles, duly assembled and connected, makes the Picture

- Pilot services delivery will be activated in the early stages of the project in order to set up immediately a strong relation with users, gain their trust and start the iterative process of definition, tuning and quality assessment. In parallel, effort will be spent to define interconnections of processing chains and delivery system with the final objective of developing a common portal, based on EU harmonisation directives, for the provision of durable and long term sustainable services. To this extent, architectural implementation and studies will take into account specific requirements and aspects of service delivery related to security, such as management of information confidentiality and "dual use" sources of information.

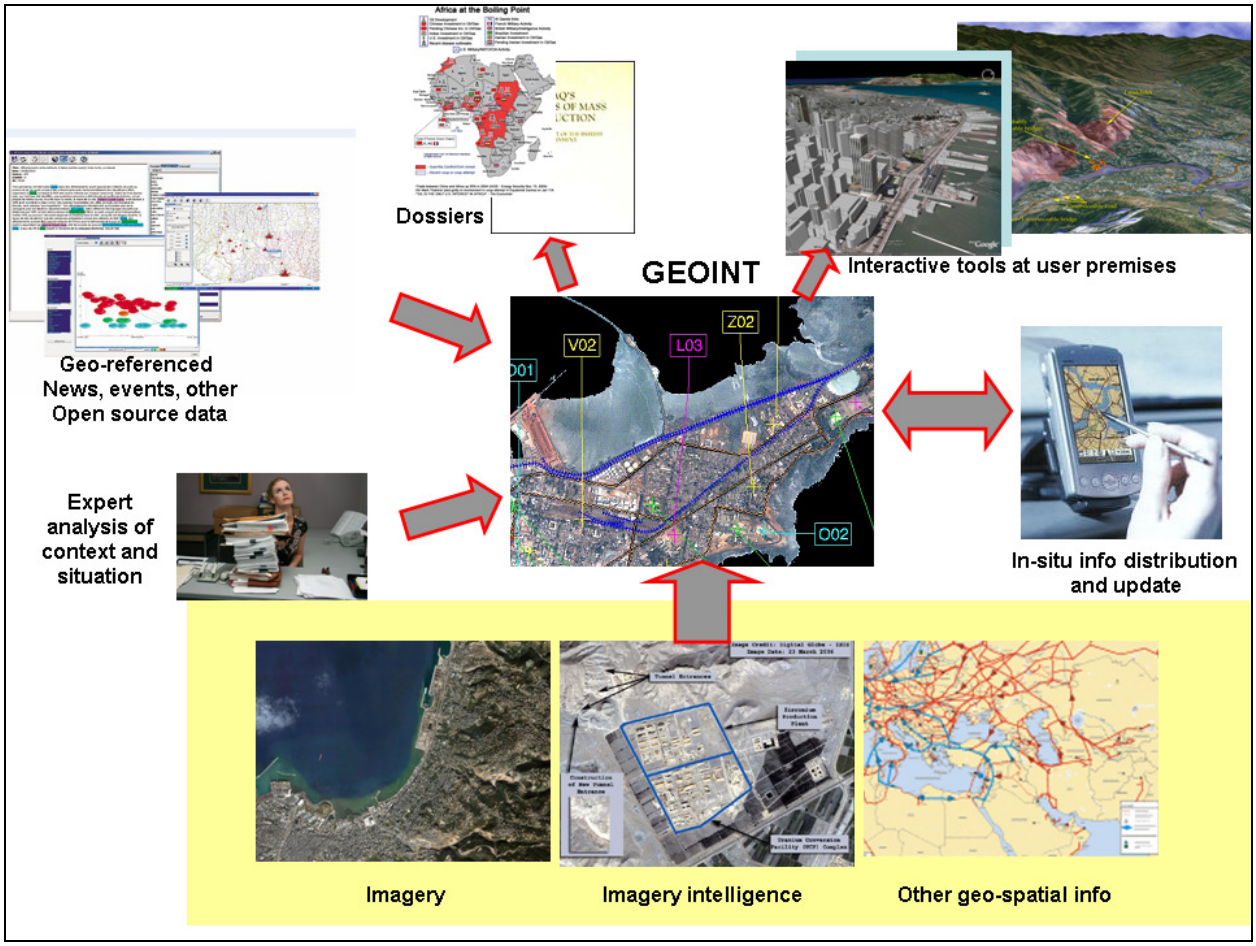

Fig. B-2: The GEO Intelligence concept

B.1.1.5 S&T Objectives

Understanding of the topics addressed by the call

The goal of G-MOSAIC project is to **develop pre-operational GMES pilot services** in the field of security, related to external regional crises:

- Addressing **all the phases of the crisis management cycle** (intelligence for situation awareness, monitoring, early warning, preparedness, crisis and post-crisis management)

- Demonstrating **operational scenarios** integrated in the users workflow and decision making process
- Developing **innovative service chains based on building blocks already developed in the former GMES projects** both in the domain of security (LIMES, GMOSS) and in related fields (RESPOND, "Land" projects,..)
- Validating the **content of the information provided** and assessing the **service operational performance against user expectation**
- Integrating at European level existing capabilities both in the **provision of geo-spatial information and in context and situation analysis** thus trying to fill the gap with the users
- Studying an architectural model for **long term sustainable provision of services for security**
- Identifying recommendations for the **development of new sensors and missions**, to improve GMES services provision for Security

G-MOSAIC S&T objectives

The first S&T objective is to set-up pilot phase activity demonstrating operational scenarios with strong involvement of users.

- First services will be provided after 9 months from the beginning of the project.
- The activities will rely on service chain assembled, according to innovative methodologies, using existing building blocks and on a common platform for the integration of context and situation analysis and information and for the delivery to users.
- Content of the services will be validated by independent institutions.
- End users will certify the acceptance of service quality; the main performance criterion will be the level of integration into the user's workflow.

The second S&T objective is to set up the environment for long term sustainable provision of the services required by end users and demonstrate its feasibility.

- It will target the two sides of security operational concept: on one hand interoperability of data processing and delivery systems, on the other hand dual use of systems.
- It will take into account of harmonization directives (INSPIRE) extending them to the specific security domain.
- It will ensure a proper architecture modelling for security services feasibility and its long-term sustainability.
- It will provide prototype solutions for improving accessibility of information while addressing the security of sensitive data.
- A data policy framework will be established.

G-MOSAIC project activities and their relation with objectives

In order to achieve its objectives, G-MOSAIC is articulated into three main activities:

1. **User scenario and technological framework definition**
2. **Service cases deployment and appraisal**
3. **Preparation for sustainability**

The three activities include specific objectives to be accomplished during the project lifetime. A list of these detailed objectives and their relation with project milestones (see section 1.3 for a complete reference) is included in the following table:

Main activities	Specific objectives	Main project outcomes and milestones
1. User scenario & technological framework definition	• Analyse relevant security policies and identify scenarios requiring info services • Cross-cutting analysis of GMES capabilities, gaps, standards, data needs, Stakeholders identification • Definition of Security Operational Concepts	ML2 (T0+9 months): • Issue of Policy framework, GMES capabilities and technological gaps analysis, analysis of user operational scenarios, analysis of architectural solutions, service cases identification, consolidation of EO data provision needs • Service cases defined, issue of Service Chains prototypes ready to be run in Service Cases; common portal V1 prototype ready to integrate and deliver pilot services, required data (EO and non EO) ML4 (T0+24months): • Service cases re-defined or updated, issue of Service Chains prototypes ready to be run in Service Cases for the second phase pre-operational deployment; common portal V2 prototype ready to integrate and deliver pilot services
	• Service chain definition and implementation, including methodology, common portal prototype, and validation plan • Service cases (specific operational scenarios) definition including appraisal and quality assessment criteria • Sustainable Economic Models for security services • Model Service architecture in terms of interoperability and security aspects.	
2. Service cases deployment & appraisal	• Run service cases on a common platform by delivering to users thematic geo-spatial information integrated with context and situation expert analysis and other geo-referenced unstructured sources • Validate geo-spatial information provided by service chains	From ML2 to ML3 (timeframe of 9 months), and from ML4 to ML5 (timeframe of 6 months): • Pre-operational pilot services validation, through the deployment and operation of service cases, delivered thanks to the common portal managing and integrating the service network. The capability to provide on demand pilot services (WP3300) will be seamlessly available from ML2 to ML5 (with a predefined ceiling on volume of total potential production)
	• Define G-MOSAIC contribution to Security Services Portfolio and Data Access Scenario • Define contracts and QoS models and define a possible roadmap to GMES security target architecture and recommendations	ML3 (T0+18months): • Issue of a first identification of G-MOSAIC contribution to GMES security Services Portfolio identification is issued. • Issue of Data access scenario for EO and non EO data necessary to services provision • Standard implementation analysis. ML6 (T0+36months): • Review of outcomes and second issue

Main activities	Specific objectives	Main project outcomes and milestones
	• Collect as continuously as possible feedback on the level of acceptance of the services and their integration into user workflow • Tune and update definition of service cases in accordance to feedback from users and define new thematic info needs	ML4 (T0+24months): • After the first pilot services deployment timeframe, Service chains operational reports and Users Service Appraisals are issued. • Thanks to the "lesson learnt", updates of methodology, of service chains specification, of service cases are implemented. ML6 (T0+36months): • Final appraisal of users on service quality, operational services and common portal reports
3. Preparation for sustainability	• Bring Information exchange into compliance with INSPIRE and other harmonization policies, taking into account security related constraints	ML3 (T0+18months): • After first pilot services deployment a Standard implementation review is issued, together with an interoperability analysis of security service architecture ML5 (T0+30months): • Review of outcomes and second issue
	• Identify sustainable economic models for G-MOSAIC services provision within the GMES framework	ML3 (T0+18months): • Taking into account the identified scenarios for services, the GMES capabilities, and stakeholders, a services provision cost and funding sources analysis is issued. ML5 (T0+30months): • Review of outcomes and second issue
		ML4 (T0+24months): • Sustainable economic model scenarios are defined and reported. ML6 (T0+36months): • Review of outcomes and second issue
	• Study sustainable architectural models including the prototyped solutions addressing security specific issues and requirements	ML3 (T0+18months): • Understanding Requirements for the definition of an Architecture description of G-MOSAIC security services. ML4 (T0+24months): • Architecture models description • Evaluation of architecture models Reports

Main activities	Specific objectives	Main project outcomes and milestones
	• Identification of recommendations on sustainable architectural solutions for G-MOSAIC security services provision, within GMES framework	ML6 (T0+36months): • Final Report on G-MOSAIC achievements in terms of service portfolio identification, contribution to GMES security architecture design, sustainable models for service provision.

Table B-1: Project Objectives against Milestones and Outcomes

B.1.2 Progress beyond the state-of-the-art

Security represents, together with Environment, one of the basic fields of application for GMES EO based geo-information services.

In the Environment domain a quite straightforward sub-classification can be outlined on the basis of "thematic" areas (i.e. what has to be monitored, like land, marine or atmosphere) and/or according to specific operational requirements (e.g. fast response time, like in emergency situations).

On the other hand, **Security** is, by definition, a complex topic, where multi-level integration is mandatory and different sub-domains often feature significant overlapping areas and correlations.

In order to try to classify security activities, let us consider three different (and orthogonal) dimensions. The first one is related to the typology of threat addressed (e.g. illegal activities, terrorism, proliferation and treaty violations, wars). The second one refers to time, or the evolutionary stage of the process (e.g. intelligence, early warning, preparedness, crisis and post crisis management; see Fig. B-3: Phases of Security related crises in paragraph B.1.2.2.1).

The last dimension represents the "location" of the issues addressed with respect to the main target of GMES projects: EU citizens and institutions. At first approximation we can define "homeland security" issues, trans-border issues (e.g. starting outside and getting inside EU borders) and issues located in external areas.

Given these definitions G-MOSAIC will address regional crises outside Europe (and their relation to most common threats) and will provide services in support of all phases of the crisis management (cyclic) process (as already stated in Chapter B.1.1.1).

As a consequence, the main users of the services will be EU level institutions (DG-RELEX and EUMS/EUSC) which are in charge of crisis related activities in foreign countries, and EU member states foreign affair ministries, MoDs and intelligence centres.

B.1.2.1 State of the art

On the basis on this complex and interconnected framework, G-MOSAIC will rely on the following "precursor" initiatives, achievements and projects:

1. Security related (GMES and non GMES) projects:
   - **LIMES:** an ongoing 6th FP project for the development of security services addressing homeland security, terrestrial border monitoring, maritime "border" security and humanitarian aid.

     The project includes also the development of basic and value added products (RTD activities) such as specific feature extraction. It is expected that this products will be integrated as "building blocks" into the G-MOSS service chains.
   - **GMOSS**: a 6th FP Network of Excellence (NoE) for connecting and integrating Europe's civil security research aimed at developing and maintaining an effective capacity for global monitoring using satellite earth observation. Addressed science and technologies encompass generic "basic" techniques and science on specific themes (addressed warning factors for regional crises e.g. monitoring of treaties, population movements, monitoring of infrastructures and damage assessment). Most of GMOSS partners are involved into G-MOSAIC and they will contribute with already developed "building blocks" for the provision of the services.
   - **MARISS**: an ongoing ESA-GSE (GMES Service Element) project on maritime security. The project developed a thematic service chain, integrating geo-spatial information coming from different and heterogeneous sources.

     In addition MARISS is developing an architectural solution based on a virtual network which includes a client to be deployed at the user premises with active functionalities for integrating additional information (not available to the service provider).
   - **ASTRO+**: PASR project (already completed) that set up a complex operational scenario to demonstrate to EU stakeholders the potential of using Space to support Security operations. It

experimented in an operational simulation the integration of the different space technologies: Earth Observation, Telecommunication and Navigation.

- **"CFSP Innovator"** (DUE-ESA, completed). It aimed at demonstrating a set of products and services based on super-resolution techniques applied to SAR data from ERS-2 and/or ENVISAT for security applications.

2. Projects for the definition of infrastructure and GMES architecture:
   - **OSIRIS** (6th FP) provides standard interfaces between users application environment and in-situ systems. On one hand, it facilitates access for users to multi-domain sensor information, and on the other hand, it addresses the smart deployment, use and reconfiguration of in-situ sensor systems. OSIRIS targets the GMES Program, and focuses on the monitoring, preparation and response phases of environmental risk and crisis management. G-MOSAIC will benefit from OSIRIS as a cornerstone in terms of system architecture specification and in-situ data acquisition.
   - **WIN** (6th FP) develops a Service Oriented Architecture for the provision of support services in emergency domain. In particular it will test the behaviour and the response of a service oriented architecture when dealing with emergency information needs.
   - **BOSS4GMES** (6th FP) builds-up pre-operational infrastructure capabilities for the following transverse topics:
     - Data validation and fusion from multiple sources.
     - Data assimilation and data integrity.
     - Data delivery processes of relevant systems (satellite, in-situ).
     - Interoperability and interconnection of the data processing and delivery systems
     - Organisation, system and service architecture.

     Each service will then be assessed from data collection to the delivery to the end customer. The assessment will address the key sustainability issues and focus upon service infrastructure, data requirements and ease access to these data, core services/products, etc. From these analyses, synergies, common components (between services within the same thematic domain, and also between different domains) and potential upgrades of service infrastructures to foster GMES sustainability will be identified (e.g. common interfaces, common infrastructures, practical arrangements for the exchange of data/products etc).

3. Projects which developed/are developing emergency response capabilities:
   - **RESPOND** (ESA-GSE) which represents the "service" answer to the operational need for emergency mapping and BOSS4GMES (6th FP) which is a step towards fully operational and sustainable emergency response services.

     It is clear that rapid mapping in the occurrence of an emergency is a key component in the crisis management process. It can be used both for rapidly producing reference and assessment maps in the case of unpredicted events or to update emergency plans assembled during preparedness phase.

     For these reasons rapid mapping service chains will be used by G-MOSAIC as basic "building blocks" and integrated into more complex service cases.
   - **CHORIST** (6th FP) The CHORIST project is a 3-year project (June 2006 - May 2009), funded by the European Commission, which addresses Environmental Risk Management in relation to natural hazards and industrial accidents.

     CHORIST will propose solutions to increase rapidity and effectiveness of interventions following a major natural and/or industrial disaster in order to enhance citizens' safety and communications between rescue actors.
   - **WISECOM** (6th FP) The WISECOM project studies, develops, and validates by live trials candidate rapidly deployable lightweight communications infrastructures for emergency conditions (after a natural or industrial hazard).

     The system integrates terrestrial mobile radio networks - comprising GSM, UMTS, WiFi, and optionally WiMax and TETRA - over satellite, using Inmarsat BGAN and DVB-RCS systems. WISECOM uses lightweight and rapidly deployable technologies, and incorporates location-based services. The infrastructure is intended to cover immediate needs in the first hours and days after

a disaster event, as well as medium to longer term needs, during the recovery and rebuilding phase following an emergency.

In addition to the heritage from the listed projects, due to the very interdisciplinary nature of G-MOSAIC security services, it is foreseen the integration of products and service chains from other GMES fields of application. The nature of the geo-information produced is the same, what will be innovative is the interpretation of the information and the level of integration with other information and data.

B.1.2.2 Progress beyond state of the art

The following main areas of improvement are targeted by G-MOSAIC:

- Full exploitation of a double level (double step of integration) approach: **service chains and service cases**:
  - Assembly of technological products into an innovative service chain (thematic – dedicated to security), according to a newly defined methodology
  - Integration of different thematic information into complex service cases with the addition of context and situation analysis (at "political" level) mostly based on human experience and integration of geo-referenced structured and unstructured data from other sources.
- Involvement of **new classes of users**, implying:
  - Gaining the trust of these users by flexibly providing services tailored to their operational needs
  - Quality acceptance of services based on their level of integration into user workflow and consequent decision support chain.
  - Provision of deliverable as simple as possible and easy to communicate, tailored for politicians and diplomats.
  - Provision of geo-spatial information to operative users (e.g. crisis rooms), enabling a third level of integration, at the user premises, with information and data not available to the service provider (restricted access).
- The definition/demonstration of **a sustainable model of security services architecture:**
  - Definition of the operational concepts and scenarios for the security G-MOSAIC services in terms of pre-operational and operational capabilities and assets, interoperability and dual-use issues, and economic, organizational and operational aspects.
  - Definition of a clear and consistent understanding of all the main economic issues on G-MOSAIC services and more in general on GMES Security services.
  - Definition of a general GMES services architecture model relevant to security delivery including the description of horizontal services and the associated concept of employment to support geo-intelligence operations.
  - Demonstration of security-related concepts like the protection of information confidentiality, cooperative mapping functions and integration of horizontal services like data mining.

B.1.2.2.1 The two levels logic for Security Pilot Services

Security issues related to regional external crises have some peculiar and complex aspects:

- The particular nature of users, their heterogeneity in terms of information need and institutional role (users include politicians, diplomats, operative crisis rooms…)
- Crises are related to a specific geographic area (a region) but show a complexity due to several independent "thematic" factors contributing to the whole picture
- Crises undergo a time evolution process (which is often cyclic). Figure 1-3 depicts the crisis cycle highlighting its main phases.

In order to cope with this complex framework a two level logic for the G-MOSAIC pilot services was set-up.

Figure 1-4 outlines the information flow, starting with raw EO data, identifying the service component which will be developed and activated during the project phases.

In terms of information management the two levels correspond to two different level of integration, involving different actors.

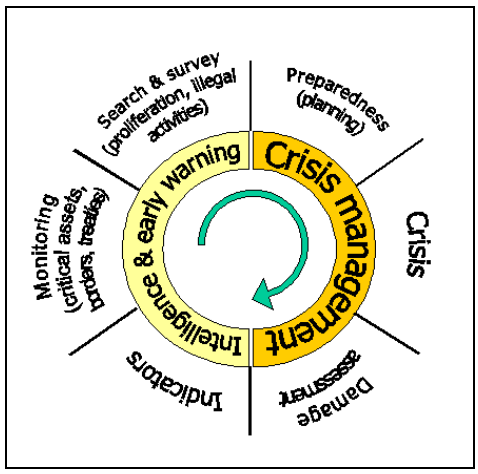

Fig. B-3: Phases of Security related crises

- **Service chain**: Systems for the production of thematic geo-spatial information, based on a pre-defined methodology for the assembly and concatenation of already existing building blocks. Building blocks include:
    - Data pre-processing tasks
    - Advanced processing operations on data (e.g. feature extraction, change detection analysis…)
    - Expert human interpretation
    - Integration with non EO data, products and information

  The output of the service chain is a set of geo-spatial information addressing a well defined theme and/or a defined phase of crisis management process.
- **Service case:** the implementation of a user operational scenario with well defined user and area of interest. It involves the use of geo-spatial information provided from one or more service chains and includes some additional activities such as:
    - Context and situation analysis mainly based on human experts
    - Geo-referenced unstructured information about the crisis (e.g. news, events..)
    - Packaging and delivery of the final results in accordance to user operational needs.

From the users perspective the **service case** is the domain where user can confidently contribute to definition and implementation activities and to manipulate technological tools tailored to their needs. On the other hand **service chains** are the domain where project partners can bring the heritage of ten years of technological development of GMES services, and deploy innovative products, processing methodologies and tools for the specific thematic information needs of the service cases.

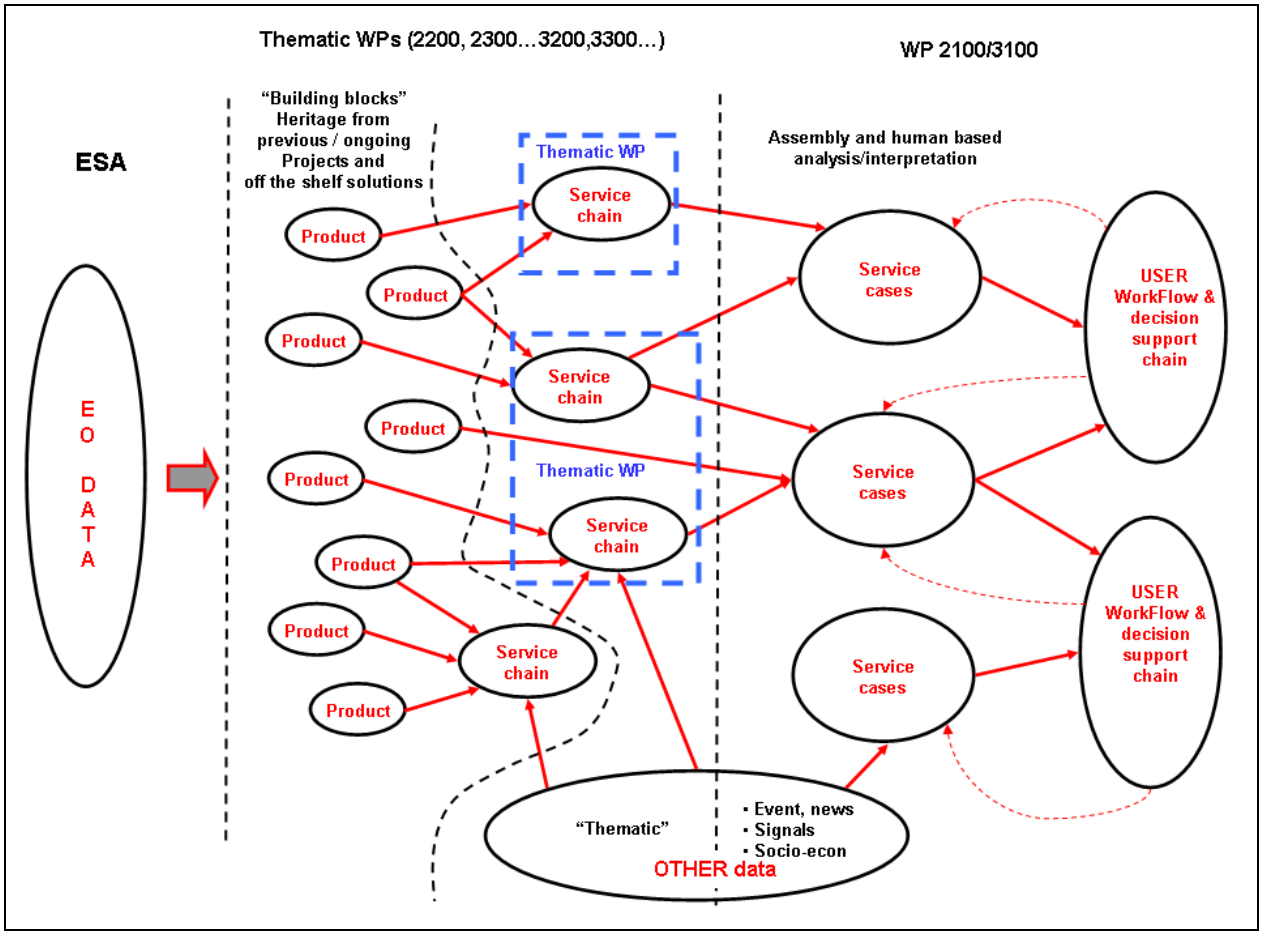

Fig. B-4: The G-MOSAIC "Value Adding Flow"

As an example let's analyse a "realistic" scenario for a service case.

The Great Lakes region is one of the main target area for Monitoring and Early Warning activities aimed at managing potential threats and to avoid negative impacts on Europe.

Service chains exploited will address the following themes:

- Illegal activities: providing information about conflict resources related activities such as coltan or uranium mining. The service chain will take advantage of the newly available SAR VHR data (due to the persistent cloud coverage in the area) and of the already developed building blocks for, say, accurate co-registration and change detection. Additional vector information related to legal mining activities will be integrated at this level.
- "Population movements", both under the point of view of population pressure crisis indicator, based on the analysis of SAR HR (again co-registration and change variations building blocks) data and of changes in position and dimension of human settlements based on time analysis of night lights with DMSP / OLS.
- Monitoring of critical assets: manly dedicated to the control of permanent and temporary military infrastructure. Based on already available building blocks of feature extraction (both from SAR and optical data), data fusion (SAR with optical) and "object-oriented" change detection (Oriented at landcover/landuse changes).

Geo-spatial information produced by the service chain will be integrated in a GIS environment together with socio-economical data, geo-referenced news / events and expert political analysis addressing the "stateless" areas of East Congo, its ethnic distribution, the level of instability and the impact of what was observed by the service chain.

As a final step G-MOSAIC will generate a complete dossier analysing the situation and/or a set of information layers ready to be browsed and "manipulated" by the user's interactive tool (e.g. a globe viewer). According to user's specific needs such information could be made available at the user main

centre (e.g. a crisis room) or distributed to remote users (e.g. the embassies). These remote users could also contribute by adding new geo-referenced information acquired on site.

Figure 1-4 also highlights the domain of G-MOSAIC project (and relevant "operational" WPs) against other "external" resources such as: ESA led EO-DAP for the coordinated provision of EO multi-satellite data, and building blocks (either product processors or service chains) already existing as an heritage from completed or on-going projects in the domain of security or in different fields of application.

B.1.2.2.2 Users involvement

User's involvement is a key issue for successful outcomes of the project. Concerning G-MOSAIC Target User Segment, this crucial task is really challenging due to its inter-pillar (mainly EU Communities and Common Foreign Security Policies) nature.

This is why particular care has been put in designing the User engagement activities of the project.

G-MOSAIC Users will be involved at two levels:

- ***Strategic level***: for dissemination, new organizations engagement, workshops, project results appraisal, contribution to a general consensus on GMES Security;
- ***Operational level***: for services scenarios design, services delivery, service quality assessment and training.

A **User Advisory Board** will be established within the project in order to foster synergies and exchange of information between different GMES stakeholders, including users from different pillars of EU.

In fact, one of the G-MOSAIC ambitions is to participate to the consensus building on GMES Security and to facilitate the on-going processes that may bring to the organization of a User Group for GMES Security Services.

The two levels of interface will be linked together during the project activities, thanks to the direct involvement of some partners of the Consortium in both the activities, to the organization of at least three workshops, to an effective dissemination strategy, and to the seamless dialogue that will be established between the Consortium (especially in the operational activities) and the Users.

This approach has been already agreed in principle with some of the G-MOSAIC main Users, as this is the most effective one in order to establish a common language between service providers and security related institutions, and to validate operational service scenarios as requested by the Work Program.

In particular, main institutional users will actively participate to the following activities:

- General service operational scenario definition
- Service cases definition
- Assessment of operational performances and quality of services
- Quantification of the level of integration of services into their own workflow

The project organization and time plan are set up with the main purpose of maximizing the flexibility of response to contingent request from the users (including a rapid mapping capability – WP3300).

Pilot Services will be operated during the two cycles with a "day to day" collection of user's feedback thus putting into real action the concept of: **"Develop while delivering"**

Table B-2: User engagement status summarizes the users of G-MOSAIC pilot services at EU and member states level.

The list of potential services for the users is provided in Table B-9: User and Services.

In addition, thanks to the User Engagement activities and to the institutional role of some of the primary users, some additional organizations may be involved in the service cases cycle (definition, operation and appraisal), such as:

- other EC Directorates (ECHO, ..);
- World wide organisations (UN, World Bank..);
- organisations of states (African Union, OCSE,..);
- Third countries (African nations, the Peace-building mechanism of the AU; the PAN-START Office in Nairobi; UNEP-DEWA; the ECA)

USER (Country)	Comments	Mandate (Institutional mission of the organization, relevant to the GMOSAIC themes)	Task (what tasks they perform to accomplish the mandate)	Expected GMOSAIC service chain involvement	Service Cases	Contact Company	Commitment
DG-RELEX (EU)	EU External relations Directorate-General	Support EU level politicians with top level analysis on ongoing and potential crises in foreign countries	Define strategies of intervention (stability instrument) to prevent and/or mitigate crises in foreign countries	• Crisis indicators • Illegal activities/conflict resources (timber, coltan, diamonds, copper, crops) • Routes (border crossing, refugee camps, migrations) • Critical assets monitoring, event assessment • Support to crisis operations (both preparedness and emergency)	for WP2 and WP 3 service cases	TPZ	Ready to develop the relationship with G-MOSAIC
EUMS (EU)	EU Military Staff	The EUMS is a General Directorate within the Council General Secretariat. It is the only permanent integrated military structure of the European Union The EUMS provides in-house military expertise for the Secretary-General/High Representative (SG/HR).	The European Union Military Staff (EUMS) performs early warning; strategic planning; and situation assessment	• Crisis indicators • Illegal activities/illegal crops • Critical assets monitoring • Support to crisis operations	for WP2 and WP 3 service cases	EUSC	The EU Military Staff will be ready to assist the Satellite Centre in defining needs as a potential end user of the services, should this be deemed useful
SITCEN (EU)	EU Joint Situation Centre	The EU Joint Situation Centre (SitCen) monitors and assesses events and situations worldwide on a 24-hour basis with a focus on potential crisis regions, terrorism and WMD-proliferation.	▪ Contribute to early warning (in conjunction with other Council military staff). Sources: open source material, military intelligence, non-military intelligence and diplomatic reporting; ▪ Conduct situation monitoring and assessment; ▪ Provide facilities for crisis task force; and ▪ To provide an operational point of contact for the High Representative.	• Crisis indicators • Illegal activities/illegal crops • Critical assets monitoring • Support to crisis operations	for WP2 and WP 3 service cases	EUSC	The Joint Situation Centre will be ready to assist the Satellite Centre in defining needs as a potential end user of the services, should this be deemed useful (letter from SITCEN DIR to EUSC DIR).

USER (Country)	Comments	Mandate (Institutional mission of the organization, relevant to the GMOSAIC themes)	Task (what tasks they perform to accomplish the mandate)	Expected GMOSAIC service chain involvement	Service Cases	Contact Company	Commitment
DG-DEVELOPMENT (EU)	Directorate General for Development (DG DEV)	DG Development formulates the development policy applicable to all developing countries and conducts forward studies to this end.	Relations between the EU and the African, Caribbean and Pacific (ACP) states are an important aspect of the EU development cooperation.	• Crisis indicators • Illegal activities/illegal crops • Routes (border crossing, refugee camps, migrations) • Critical assets monitoring • Support to crisis operations (emergency, reconstruction)	for WP2 and WP 3 service cases	TPZ	Interested to the proposal
Ministero Affari Esteri (Unità Crisi) (IT)	Italian Ministry of Foreign Affairs, Crisis Room	Support Italian citizens staying abroad during crisis. Support other European citizens form countries without embassies staying abroad during crisis.	Prepare and execute evacuation plans. Collect information about potential crisis.	• Crisis indicators (drought, population pressure) • Critical assets (military plants, transport infrastructures, Industry, resources) • Treaty monitoring • Support to crisis operations (both preparedness and emergency)	for both WP2 and WP3 service cases	TPZ	Letter of Interest
French Military Intelligence (DRM) SAG (FR)	French Directorate of Military Intelligence	As a part of Military Intelligence Directorate SAG has to present Strategic Intelligence Reports in a geospatial way (Maps, Image maps,). Those Geospatial intelligence reports are provided to political, strategic and sometimes operational levels.	SAG provides rapid mapping, studies and power point presentation in any topic interesting Military intelligence at political and strategical level.	• Crisis indicators (drought, population pressure) • Routes (border crossing, refugee camps, migrations) • Critical assets (military plants, transport infrastructures, Industry, resources) • Treaty monitoring • Support to crisis operations (both preparedness and emergency)	for both WP2 and WP3 service cases	FRS with INFOTERRA FRANCE	Agreed in principle

USER (Country)	Comments	Mandate (Institutional mission of the organization, relevant to the GMOSAIC themes)	Task (what tasks they perform to accomplish the mandate)	Expected GMOSAIC service chain involvement	Service Cases	Contact Company	Commitment
Centro Nacional de Inteligencia (E)	Spain Intelligence Agency - CNI	The National Intelligence Centre (CNI) is the public institution responsible for providing the Prime Minister and the Government of Spain with information, analyses, studies or proposals that allow for the prevention and avoidance of any danger, threat or aggression against the independence or territorial integrity of Spain, its national interests and the stability of its institutions and the rule of law.	Under the direction of the Government, which sets out its information objectives in an Intelligence Directive on an annual basis, the CNI discharges its missions through the collection of information not found in traditional channels, both inside and outside Spain, using its own means and procedures. The CNI is a support body in the decision making process and its mission ends where that of other State bodies in charge of decision making starts.	• Crisis indicators (drought, population pressure) • Routes (border crossing, refugee camps, migrations) • Critical assets (military plants, transport infrastructures, Industry, resources) • Treaty monitoring • Support to crisis operations (both preparedness and emergency)	for both WP2 and WP3 service cases	EUSC	Contacted
BKA (D)	German Federal Criminal Police Office	Follow illegal activities in the framework of national and international crime	Investigations on criminal activities in the context of terrorism, illegal mining, drug transport	WP 2500	for WP2 service cases	DLR	Letter of Interest
Global Witness (GB)	NGO based in UK focussed on anti-corruption and illegal activities	Follow illegal activities resulting from timber logging, diamonds and mining to reduce conflict and strengthen human right	Influencing international, regional and national policies after carrying out in-depth investigations. Ensure that crucial investment in the natural resource sector is equitable, sustainable, transparent and non-corrupt,	WP 2500	for WP2 service cases	DLR	Letter of Interest

USER (Country)	Comments	Mandate (Institutional mission of the organization, relevant to the GMOSAIC themes)	Task (what tasks they perform to accomplish the mandate)	Expected GMOSAIC service chain involvement	Service Cases	Contact Company	Commitment
Ministere de la Defense (F)	French MoD, Joint Military staff, Space Joint programs, Space and Intelligence sections, geospatial Information staff and Procurement agency	Geospatial information people from joint staff and Procurement agency are in charge of providing to Forces, headquarters (strategical, Operational, Tactical) and Intelligence services all geospatial information regarding their missions. This staff is in charge of driving the GeoDe 4D project which looks like a GMES for Defense.	They decide which products are necessary for different military staff. They design, finance and supervise the production system for: paper and digital maps from scale 1/ 5 M up to 1/5 K, 3D models, Orthoimagery, thematic maps (refugees, transport network, industries,...), updated geospatial data base, geographical reports or studies, in the field geographical reports,....	• Crisis indicators (drought, population pressure) • Routes (border crossing, refugee camps, migrations) • Critical assets (military plants, transport infrastructures, Industry, resources) • Treaty monitoring • Support to crisis operations (both preparedness and emergency)	for both WP2 and WP3 service cases	FRS with INFOTERRA FRANCE/ TCF	Letter of Interest New letter of interest and expression of needs are in progress
IAEA (Intern.)	IAEA is a UN specialised Agency	Its mandate is to monitor nuclear activities of Parties to the Safeguards agreement. It also promotes peaceful uses of nuclear energy.	On-site inspection of nuclear facilities, carries out material accountancy, uses satellites for its safeguards procedures	Develop and provide basic satellite image processing techniques and image interpretations using key for earth-based relevant targets	for WP2 service cases	KCL	Contacted
Italian MoD (IT)	Italian Minister of defence	Involved in peacekeeping missions, missions to support Italian/European citizens in foreign countries affected by crisis.	To support local police with training and cooperation activities To control strategic communication routes To verify the maintenance of the Peace Treaty To support international Organization (ONU) and Local organization in the aid to the refugees To keep contact with the Local authority and the international and not governmental Organizations To control the border and critical assets	• Crisis indicators (drought, population pressure) • Routes (border crossing, refugee camps, migrations) • Critical assets (military plants, transport infrastructures, Industry, resources) • Treaty monitoring • Support to crisis operations (both preparedness and emergency)	for both WP2 and WP3 service cases	TPZ	Interested to the proposal

USER (Country)	Comments	Mandate (Institutional mission of the organization, relevant to the GMOSAIC themes)	Task (what tasks they perform to accomplish the mandate)	Expected GMOSAIC service chain involvement	Service Cases	Contact Company	Commitment
Spanish MoD (E)	Spanish Minister of defence	Involved in peacekeeping missions, missions to support Spanish/European citizens in foreign countries affected by crisis.				GMV	In the process of signing a letter of interest
Spanish Foreign Affairs Min (E).	Spanish Foreign Affairs Min					EUSC (INDRA ESPACIO / GMV)	In the process to sign the support letter.
Aquas de Portugal (P)	Stakeholder in water management in Portugal & in Portuguese speaking African countries	- legal responsibilities in water quality management (in lakes, in rivers, ...) - cooperate with some government agencies related to water management, bringing technical expertise	Technical analysis in decision-making process for wastewater treatment requirements; Interpretation of data, in order to identify the real causes of water quality problems; Monitor the state of aquatic environment, on river basin scale, looking for trends, unexpected changes; Good cost effectiveness in achieving those goals, based on Earth Observation technologies and Computer Modelling systems.	Crisis indicators (water quality)	for WP2 service cases	IST	Letter of Interest

USER (Country)	Comments	Mandate (Institutional mission of the organization, relevant to the GMOSAIC themes)	Task (what tasks they perform to accomplish the mandate)	Expected GMOSAIC service chain involvement	Service Cases	Contact Company	Commitment
Ministério dos Negócios Estrangeiros (P)	Portuguese Ministry of Foreign Affairs	The Portuguese Ministry of Foreign Affairs is the government office in charge of the advance and safeguard of the strategic, political and economic interests of Portugal and Portuguese citizens through effective diplomacy while striving for a safe, just and prosperous world. Another important activity is the support to Portuguese citizens and Portuguese communities living and/or working in countries other than Portugal.	The Portuguese Ministry of Foreign Affairs achieves the goals specified in the mandate mainly through the participation in international institutions and organizations and through the "field work" performed by the different Portuguese embassies and consulates around the world	The Portuguese Ministry of Foreign Affairs will be involved in the Service Case #1, support to the continent early warning system for Africa, namely in WP 2100 and 3100, with particular focus on the integration of geo-political data associated to PALOPS countries (former Portuguese African colonies) in aspects related with crisis prevention, development support and identification and analysis of economics potential.		SKYSOFT	Interested to the proposal
German reconnaissance institutions	Subunits of German intelligence service and Bundeswehr, respectively	Reconnaissance	Operating reconnaissance globally	Routes and borders; Critical assets	for WP2 service cases	ITD	Interested to the proposal
THW (D)	Governmental disaster relief organization of the Federal Republic of Germany	Its statutory tasks include the provision of technical assistance at home and humanitarian aid abroad.	Technical hazard prevention, technical assistance in the infrastructure field, command/communication logistics, technical assistance for environmental protection, population supplies	Routes and borders; Critical assets	for both WP2 and WP3 service cases	ITD	Interested to the proposal

USER (Country)	Comments	Mandate (Institutional mission of the organization, relevant to the GMOSAIC themes)	Task (what tasks they perform to accomplish the mandate)	Expected GMOSAIC service chain involvement	Service Cases	Contact Company	Commitment
Military Cartography Section, Armed Forces (Austria)	Support to external humanitarian action in the context of foreign policy implementation	Support for Austrian armed forces as part of EUFOR, Tschad	protection of several refugee camps, logistics, water supply	• Crisis indicators (drought, population pressure) • Routes (border crossing, refugee camps, migrations) • Critical assets (transport infrastructures, water resources) • Conflict mapping (rebel groups, national armies of Sudan and Tschad) • Treaty monitoring • Support to crisis operations (both preparedness and emergency)	for WP2 and WP 3 service cases	PLUS	Contacted Interested to evaluate G-MOSAIC services Letter of interest in preparation

Table B-2: User engagement status

B.1.2.2.3 The Integrated Service Cases Approach

As already said, security is a global issue and heterogeneous sources of data have to be integrated. The innovative G-MOSAIC project organization sets two separated levels of integration:

- At thematic level: **Service chains** integrate technological resources (building blocks) with the "GEOINT" approach, i.e. providing geo-spatial intelligence which integrates imagery processing and analysis and other open source information
- At user operations level: **Service cases** address the user interest and demand for information, by integrating thematic outputs from the service chains, expert analysis and data (events, news…) about political situation and socio-economical context

Additional information (confidential or classified), if available, will be integrated in a further step at the user premises.

Service cases "operations" will rely on a service network connecting, in an interoperable environment, service chain processors, value adding tools and instruments, additional open source resources and users platforms.

Architectural solutions will integrate **TLC and NAV** technologies as well, to carry out the following tasks:

- **products dissemination** to "in situ" users (e.g. emergency plan to embassies and messages to citizens)
- **"co-operative" mapping** and map updating (for emergency plans both in peace time and during crisis and damage assessment)

In addition, depending on the requirements from specific users the client will be equipped with interactive analysis tools with the following functionalities:

- integration of additional information (not available to the project)
- interpret, annotate and edit the information provided
- 3D displaying and building of virtual flights on globe viewers

This **service cases approach** is important to support the analysis and the understanding of regional crises; examples of complex situation can illustrate this point.

- Earlier Iran was in non-compliance with the NPT treaty and currently has been a problem for a number of UN Security Council Resolutions. Analysis on this country would include political development in Iran over the past few years, its security concerns that may be driving its nuclear programme, an assessment and identification of its nuclear capabilities, related defence infrastructures or other essential elements such as weapons delivery systems relying on critical assets (lifelines, roads..).
- The evolving crisis in the great lakes region of RDC and neighbouring countries involves a number of interlinked themes, such as movements of population (both IDP and trans-border) frequently changing military installations, illegal activities ("conflict resources" such as uranium, coltan, timber…); emergency plan for citizens repatriation in the occurrence of a crisis escalation and supporting interventions has to be prepared for this areas.

To give an idea of the **innovative integrated service case approach**, the following table lists the potential areas of interest and the addressed issues according to actual criticality and threat analysis (preliminarily carried out with the contribution of some users). In some way the table would outline the G-MOSAIC service cases if the pilot services started at the time of proposal submission (June 07). Since global security issues are rapidly evolving and EU and MS foreign measures and actions can be updated according to these changes, the service cases will be defined and consolidated in the early stage of the project (with the users) and updated along the project lifetime.

Geographic Area	Problems description	Addressed issues
Dem. Republic of Congo, Great Lakes Area	Armed violence Instability	• Illegal activities/conflict resources (timber, coltan, diamonds, copper) • Critical assets (military plants, transport infrastructures) • Support to crisis operations (both preparedness and emergency) • Routes (IDP, border crossing, refugee camps)
Mano river basin countries (Guinea, Guinea Bissau, Sierra Leone, Ivory Coast, Liberia)	Emerged from violent conflicts Re-started development	• Illegal timber logging • Conflict resources (diamonds) • Borders monitoring • Support to crisis operations (both preparedness and emergency) • Reconstruction and rehabilitation monitoring
Zimbabwe	Failing state	• Crisis indicators (governance, economic factors, unemployment rate, HIV/Aids infection rates (gender disaggregated), migration internal/external (not population pressure), land cover change, landuse change, floods, drought, food security (pre-harvest crop estimates, seasonal rainfall variations). • Support to humanitarian action; monitoring of human rights; evidence for human rights violations.
Somalia	Conflict area Instability	• Critical assets (military plants, transport infrastructures) • Crisis indicators • Support to crisis operations (both preparedness and emergency)
Chad-Sudan	Conflict Refugee stream Humanitarian crisis Doubts of compliance to treaties	• Crisis indicators (drought, population pressure) • Routes (border crossing, refugee camps, migrations) • Critical assets (military plants, transport infrastructures) • Treaty monitoring
Niger river delta	Ethnic conflicts, EU citizens working	• Support to crisis operations (both preparedness and emergency)
Senegal	Source of illegal migration	• Crisis indicators • Migration routes monitoring
Angola	EU citizens working	• Support to crisis operations (both preparedness and emergency) • Critical assets (transport infrastructures)
North Africa	Illegal activities	• Illicit crops (drugs) • Migration routes
Iran	Doubts of compliance to NPT	• NPT monitoring / WMD • Critical assets monitoring
Middle East (Israel, Syria, Lebanon, West Bank and Gaza)	Trans-national refugees Terrorist activities	• Treaty monitoring • IDP • Borders monitoring • Support to crisis operations (both preparedness and emergency) • Crisis indicators (water) • Assessing effectiveness of rehabilitation intervention
Pakistan-Afghanistan	Lack of statehood Ethnical and cultural diversity of population Reconstruction	• Illegal activities (crops) • Border monitoring • Critical assets (military plants) • Crisis management operations

Geographic Area	Problems description	Addressed issues
		• Assessing effectiveness of rehabilitation intervention
Eastern Europe (Caucasus, Ukraine, Moldavia)	Migrants Illegal activities Terrorism	• Activities along borders & routes • NPT • Critical assets monitoring (pipelines)

Table B-3: Elements for the identification of G-MOSAIC Service Cases

B.1.2.2.4 G-MOSAIC Service Chains

A number of themes related to the different phases of crisis management (see Fig.1-3) will be addressed by G-MOSAIC project. Thematic Service chains will be assembled according to a newly defined methodology by using already developed "building blocks", in other initiatives such as GMOSS, LIMES, etc.

A service chain provides a set of geo-spatial information to be integrated into a complex service case.

G-MOSAIC service chains are listed in the following table:

Crisis Phases	***Thematic information***	***Service chain***
Intelligence & Early Warning	Proliferation & treaties	• Monitoring of nuclear decommissioning sites • Continuous surveillance of nuclear facility • Peace accords and human rights
	Crisis indicators	• Exploitation of natural resources (ENR) • Population pressure (PP) • Land degradation (LD)
	Critical assets	• Critical assets monitoring • Critical assets event assessment
	Illegal activities	• Illegal mining • Illegal timber logging • Illicit crops
	Routes & borders	• Monitoring of military activities, border crossing and related infrastructure along the border • Long range migration routes & temporary settlements along the routes
Preparedness for crisis	Contingency planning	• Contingency plan preparation
Crisis	Emergency mapping	• Terrain analysis and mobility assessment (non permanent tasks) • Logistic and deployment operations
Post-crisis & reconstruction	Damage assessment	• Damage assessment for post-conflict situations, post conflict environmental assessment (jointly with UNEP DEWA) • Support reconstruction mission after conflicts

Table B-4: G-MOSAIC themes and service chains

Some of the themes listed were already addressed in the previous project dedicated to security (GMOSS and LIMES) and in other activities/projects carried out by G-MOSAIC partners.

In the table below have been summarize the defined service chain with the potential used building block. The characteristic of each building block has been collected in the Annex C: GMOSAIC Building Block .

The Building Blocks have been grouped according to the logical processes undertaken during the service chain so the following groups have been defined

- PRE: Preprocessing group,
- ADV: Advanced Processing group
- IMG: Image Interpretation group
- GIS: GIS Integration&Analysis group
- OTH: Other process group

Work Packages		WP2300: Crisis indicators		WP2200: Proliferation and treaty	
WP leader		JRC		INDRA ESPACIO	
BB Group:	Service Chain	Service chain 1: Exploitation of natural resources (ENR index)	Service chain 2: Population pressure (PP index)	Service chain 1. Monitoring decommissioned sites	Service chain 2. Continuous surveillance of nuclear facilities
Preprocessing	Orthorectified images	x	x	x	x
	Image matching	x		x	x
	Orthorectified images				
	Satellite data preprocessing	x			
Advanced Processing	3D Change map			x	x
	MAD-Change map			x	x
	Optical 2D change detection				
	Change detection based on night-time images				
	Change detection based on low spatial resolution images.				
	Optical-Sar VHR fusion				
	RST-based change detection				
	SAR Change Detection-Raster Output				
	SAR Change Detection-Vector Output				
	Built-Up Area Estimation		x		
	Built-Up Area Structural Characterisation		x		
	Change detection	x			
	Reference maps and assessment maps				
	Processing chain for roads and border infrastructure detection				
	DEM				
	Reference maps				
Image Interpretation	Border Permeability maps				
	Asset mapping, reference mapping and monitoring of urbanized areas				
	Traficability				
	Visual interpretation and semi-automated change detection				
	Damage map				
	DWEX-3D				
	Optical (V)HR 2D LU mapping and change detection				
	Landuse/-cover estimation	x			
GIS Interpretation&Analysis	Object-based change assessment				
	GIS integration of economic data	x			
	GIS correlation od EO data				
	GIS integration of economic data				
	GIS modeling for linking economic and EO data	x			
	Object-based change assessment	x			
	GIS based land-losses estimation				
	Object-based change assessment				
	Data integration & GIS modelling				
	Integration into decision support system				
Other	ELISEO				
	Issuing situation reports				
	Maps of critical infrastructure				

Work Packages	WP leader	BB Group:	Preprocessing				Advanced Processing														Image Interpretation								GIS Interpretation&Analysis								Other	
		Service Chain	Orthorectified images	Image matching	Orthorectified images	Satellite data preprocessing	3D Change map	MAD-Change map	Optical 2D change detection	Change detection based on night-time images	Change detection based on low spatial resolution images.	Optical-Sar VHR fusion	RST-based change detection	SAR Change Detection-Raster Output	SAR Change Detection-Vector Output	Built-Up Area Estimation	Built-Up Area Structural Characterisation	Change detection	Reference maps and assessment maps	Processing chain for roads and border infrastructure detection	DEM	Reference maps	Border Permeability maps	Asset mapping, reference mapping and monitoring of urbanized areas	Trafficability	Visual interpretation and semi-automated change detection	Damage map	DWEX-3D	Optical (V)HR 2D LU mapping and change detection	Landuse/-cover estimation	Object-based change assessment	GIS integration of economic data	GIS correlation od EO data	GIS integration of economic data	GIS modeling for linking economic and EO data	Object-based change assessment	GIS based land-losses estimation	Object-based change assessment	Data integration & GIS modelling	Integration into decision support system	ELISEO
		Service chain 3: Land degradation (LD indeX)	x	x		x												x											x						x	x		x		
WP2400: Critical Assets	GMV	Service chain 1: Critical assets monitoring	x	x			x			x	x	x	x	x	x													x				x	x							Issuing situation reports
		Service chain 2: Critical assets events assessment	x	x			x			x	x	x		x	x													x			x		x							Maps of critical infrastructure
WP2500: Illegal activities	DLR	Service chain 1: Illegal mining	x	x			x	x				x																												

| | | |

Work Packages		WP3400: Consequence management, reconstruction and resilience	WP3300:Geo-spatial support for Crisis Management Operations		WP3200:Planning for crisis
WP leader		DLR	EUSC		TPZ
BB Group:	Service Chain	Service chain 1: Damage assessment for post-conflict situations	Service chain 2 Logistic and deployment operations (permanent task)	Service chain 1: Terrain analysis and mobility assessment (non permanent task)	Service chain 1: Contingency plan preparation
Preprocessing	Orthorectified images		x	x	x
	Image matching	x	x	x	x
	Orthorectified images				
	Satellite data preprocessing				
Advanced Processing	3D Change map	x			x
	MAD-Change map	x			
	Optical 2D change detection				x
	Change detection based on night-time images				
	Change detection based on low spatial resolution images.				
	Optical-Sar VHR fusion				
	RST-based change detection				
	SAR Change Detection-Raster Output	x			
	SAR Change Detection-Vector Output	x			
	Built-Up Area Estimation				x
	Built-Up Area Structural Characterisation				x
	Change detection				
	Reference maps and assessment maps				
	Processing chain for roads and border infrastructure detection				
	DEM			x	x
	Reference maps		x	x	x
Image Interpretation	Border Permeability maps				
	Asset mapping, reference mapping and monitoring of urbanized areas				
	Traficability				
	Visual interpretation and semi-automated change detection				
	Damage map	x			
	DWEX-3D	x			
	Optical (V)HR 2D LU mapping and change detection				
	Landuse/-cover estimation				
GIS Interpretation&Analysis	Object-based change assessment	x			
	GIS integration of economic data				
	GIS correlation od EO data				
	GIS integration of economic data				
	GIS modelling for linking economic and EO data				
	Object-based change assessment				
	GIS based land-losses estimation				
	Object-based change assessment				
	Data integration & GIS modelling	x	x	x	
	Integration into decision support system				
Other	ELISEO		x	x	
	Issuing situation reports				
	Maps of critical infrastructure				

Work Packages	WP leader	BB Group:	Preprocessing				Advanced Processing														Image Interpretation								GIS Interpretation&Analysis									Other	
		Service Chain	Orthorectified images	Image matching	Orthorectified images	Satellite data preprocessing	3D Change map	MAD-Change map	Optical 2D change detection	Change detection based on night-time images	Change detection based on low spatial resolution images.	Optical-Sar VHR fusion	RST-based change detection	SAR Change Detection-Raster Output	SAR Change Detection-Vector Output	Built-Up Area Estimation	Built-Up Area Structural Characterisation	Change detection	Reference maps and assessment maps	Processing chain for roads and border infrastructure detection	DEM	Reference maps	Border Permeability maps	Asset mapping, reference mapping and monitoring of urbanized areas	Trafficability	Visual interpretation and semi-automated change detection	Damage map	DWEX-3D	Optical (V)HR 2D LU mapping and change detection	Landuse/-cover estimation	Object-based change assessment	GIS integration of economic data	GIS correlation od EO data	GIS integration of economic data	GIS modeling for linking economic and EO data	Object-based change assessment	GIS based land-losses estimation	Object-based change assessment	Data integration & GIS modelling	Integration into decision support system	ELISEO Issuing situation reports Maps of critical infrastructure
		Service chain 2: Support reconstruction missions after conflicts	x	x			x	x						x	x		x																				x		

Table B-5: Service Chain and Building Blocks

B.1.2.2.5 The G-MOSAIC security architectural approach

The definition/demonstration of a G-MOSAIC security architectural perspective is an important issue of this project. In fact, the construction of an effective and adequate architecture is one of the major factors for the provision of sustainable GMES information services based on EO for security applications.

A primary step forward will be to define operational scenarios where G-MOSAIC security services are integrated. These scenarios will be defined in terms of both system protection and availability (resources and data available at any time they are required), integrity (resources and data can be modified or deleted only by the owner), reliability, confidentiality.

The project will also define a clear and consistent understanding of the main economic issues around the GMES security services; the provision of security services involves a wide range of policy sectors, information services and user communities. From this standpoint, the overall project will be linked with the on-going activities, in particular in BOSS4GMES.

As far as economic models for GMES services in security are concerned, very little research has been conducted to date, as R&D on such services has only started recently. The G-MOSAIC project will therefore comprise an up-to-date overview of:

- the economic role of each stakeholder in security contexts in creating value through GMES services;
- the economic logic beyond the operational workflows in the value chain;
- the sustainable scenarios for the evolution of the field.

Starting point are socio-economic benefits of GMES that have already been clarified and shared among European Institutions, Member States, and other stakeholder (see "Socio-Economic Benefits Analysis of GMES" PWC); the project will deepen the assessment with respect to the economic architecture of GMES, in the particular context of Security Services, analysing the potentialities of value creation. Moreover, the architectures of services provision will be investigated in terms of maximizing value for the whole array of stakeholders: from providers to end users, including investing institutions.

Then, the definition of a basic architecture model relevant to the delivery of GMES security services will be issued. This will basically include the analysis of:

- Interoperability requirements coming from various initiatives like GEO/GEOSS and INSPIRE and standard organisation like OGC, W3C and OASIS
- Security issues extracted from scenarios (e.g. confidentiality)
- Existent technological solutions like the SOA (Service Oriented Architecture).

In particular, a SOA specifies a set of components whose interfaces can be described, published, discovered and called upon through a network (definition from W3C, World Wide Web Consortium). This type of architecture, centred on the network, uses a client/server model on several levels where the software components have relations of supplier of services with loose coupling between producer and consumer.

The management of these relations is dealing with SOA technologies of implementation (Application Platform Suite, Enterprise Service Bus, Web Services), i.e. a software layer ensuring the communication by message among components which encapsulate their data and their treatments (graphical objects, business components, etc.) and allow their access through interfaces. Considering the GMES security services framework and the INSPIRE network service reference model, the problems (security, availability etc.) of the securely communicating software components are essential because of diversity of the operational functions, of the multi-localization of all different actors (defence and civilian) of that Information System and the permanent needs for exchange and cooperation between them.

The development of a prototype platform for the integration of the different service cases in a service network will be a main objective in order to demonstrate the feasibility of some security-related concepts like information confidentiality protection and QoS monitoring. Moreover the common G-MOSAIC portal will guarantee a proper support to geo-spatial intelligence activities by providing the integration of information coming from different resources as well as data mining and cooperative mapping functions that can be used by decision makers to enhance their view of crises.

The "on-the-field" experience of the common portal will also be an important input for architecture evaluation.

In this sense, for a long term perspective it could be necessary to go beyond SOA because such critical information systems needs a convergence between technologies like Grid computing, virtualisation and SOA in order to create a highly integrated ecosystem that is ultimately focused in the more general concept of QoS (that finally includes security issues).

The project will identify and evaluate alternatives of architectures to support target operational solutions.

The GMES Security architecting will be performed within a global **Concept Development & Experimentation (CD&E) approach**. This means that the architecture is seen as the technical support of the Operational activity and associated business.

Architecting in CD&E approach consists in analysing:

- The operation needs and constraints (interoperability, dual use, ..); and consequently the expected GMES Security capabilities.
- The GMES Security services to sustain the operational activities.
- The Service provisions through reuse and development of new resources (sensors, processing centres, portals, etc).
- Value analysis (analysis the cost of the services and architecture building blocks regarding the business revenues they can provide)
- Ownership and quality analysis (analysis of cost vs quality factors like safety and security; analysis of the whole life cycle of the GMES Security)
- Experiment the architecture alternatives (Integration of existing parts as far as possible, modelling of non-existing or non-integrable parts, perform simulation and evaluate the operational and support activities).
- Adjust the architectural hypothesises (operational activities, economical conditions, etc) and iterate on the previous steps until a decision on the final solution.

The proceeding described above is presented as roughly a top-down approach; but it is also to be combined with a bottom-up approach starting with architecture parts to be reuse (sensors, etc) and some others in the development strategy, then evaluating the usable services, and furthermore the current available operational activities. To this extent the architectural modelling will take benefit of the pre-operational deployment of G-MOSAIC pilot services, and of the studies on its contribution to GMES security services portfolio.

B.1.2.3 GMOSAIC Baseline data and expected progress

G-MOSAIC proposes an innovative approach to thematic information based on:

- Full integration of technological elements (building blocks) into a service chain
- The geo-intelligence approach
- Exploitation of the new sensors / mission (e.g. VHR SAR) with a significant step forward in operational performances.
- Multi-resolution analysis (search / characterize on large areas and then analyse details in relevant sub-areas)
- Service chain methodology aimed at maximizing process automation

The following table lists, for each G-MOSAIC theme, what is the state of the art and what is the expected progress beyond it.

Thematic information	*State of the art*	*Progress in G-MOSAIC*
Proliferation & treaties	Combined use of Optical and SAR already demonstrated with medium/high resolution SAR (relevant for inter-tropical areas) 2D/3D change detection technologies developed and tested in GMOSS and other projects. The algorithms rely on preprocessing like orthorectification and co-registration, which are already validated products generated by e.g. BB A-1 and A-2	• VHR SAR and 3D optical (stereo) data derived geo-information fully exploited into the service chains (2D & 3D change analysis) 2D and 3D change detection algorithms have been developed in GMOSS, LIMES and other projects (e.g. BB: B-1, B-2). These algorithms and their applicability are still R&D but shall be developed to generate validated products during GMOSAIC. This will improve a regular and more automatic usage of image processing techniques for the monitoring of nuclear facilities and other treaty related infrastructures. • Regular assessment, identification and monitoring of nuclear capabilities and infrastructures, and also "larger scale" analysis of other essential requirements such as weapons delivery systems and other related defence infrastructures • Improved monitoring of peace accords and human rights
Crisis indicators	Definition and use of crisis indicators is well established in the humanitarian aid realm. They address, with a "global" approach relative risk of disaster impact on vulnerable countries and the actual correspondence to humanitarian crisis criteria	• Geographical and thematic refinement of Crisis indicators in order to be useful in the security. • Indicators will specifically address the relations between security issues and all the possible "conflict factors" in regional crises, such as exploitation of natural resources, population pressure in urban, peri-urban and rural areas, ethnical and cultural diversity of the population, scale and impact of natural and man-made disasters
Critical assets	Some specific monitoring initiatives providing geo-information products for specific assets (pipelines, airports, harbours, etc). Test cases for the use of low spatial resolution, very frequent revisit sensors (e.g. geo-stationary "meteorological" missions in GMOSS)	• Service chains fully integrating high resolution mapping/monitoring (2D and 3D change detection) of critical infrastructures with low spatial resolution but almost continuous monitoring in time (e.g. with thermal anomalies detection on MeteoSat or night lights and their variations with DMSP / OLS)
Illegal activities	Few examples of geo-spatial information supporting illegal activities monitoring (support to Kimberley process / extraction of diamond and monitoring of areas cultivated with illicit crops (drugs)	• Multi-resolution approach for the characterization not only of the target activity but also of the surrounding environment (thus supporting the assessment of the "illegality" aspects). This relates to a new approach of monitoring illegal activities in order to detect new regions of activities and the correlations and consequences to the vicinity. Building blocks like B-1 and B-2 will be used but further research and developments are obligatory to establish a new chain for interpreting the data sets for this special topic • Full exploitation of expertise in agriculture and forestry application for accurate illegal activity monitoring / characterization. Building blocks fitting for this issue from Land GMES projects have to be identified during the beginning of the project • Integration of VHR SAR derived information for analysis in inter-tropical areas is important because of cloud cover and new instruments like TerraSAR-X have to be integrated into the

Thematic information	*State of the art*	*Progress in G-MOSAIC*
		development of the service chains.
Routes & borders	Several attempts have been undertaken in Europe in the past in order to support monitoring and to prevent the illegal flow of migrants with the use of EO techniques. For instance, JRC and CRPSM have introduced a border permeability concept and applied it to several African countries. There was also an attempt to detect camps of migrants by observing fires by IR satellite sensors	• Development of service chains which address the theme of migrations with an integrated approach, including origin and destination countries, long range routes and characterization of the population movements (refugees, terrorist or militia movements, or activities involving smuggling military significant payloads, cargos or weaponry). Special attention will be paid to border crossing activities and military activities in areas adjacent to borders
Contingency planning	The methodology for the preparation of emergency plans (both for repatriation of citizens and for intervention) is well established	• Generation of geo-spatial information (images, objects, vector layers) read y to be displayed in interactive tools with 3D functions ("virtual flights") • Full exploitation of technologies (applied to both VHR SAR and optical stereo data) to extract 3D information (DEMs and objects reconstruction) and the analysis of their changes in time • Implementation of "ready for update" plans, i.e. including also instructions for its update in the occurrence of an emergency.
Emergency mapping	Rapid mapping technologies and service chains were developed and tested within the framework of GMES initiative	• Rapid mapping service chains addressing specific information aimed at correctly activating emergency plans for evacuation and/or intervention (e.g. mobility assessment). • Implementation of methodologies/ procedures as much automated as possible with the objective of reducing preparation time in the occurrence of a crisis situation.
Damage assessment	Several technologies developed and tested for change detection and damage assessment in projects like GMOSS and LIMES). The Technologies/algorithms rely on preprocessing like orthorectification and co-registration, which are already validated products generated by e.g. BB A-1 and A-2	• A service chain will specifically address improvements to the countries rehabilitation process. The base technology is still "change detection" using BB like B-1 and B-2 as well as developments like automatic damage assessment (B-3) but imagery intelligence and additional geo-spatial information (depending on availability) will be integrated. This will lead to new products which support knowledge about reconstruction and rehabilitation process • Implementation of fast and semi-automatic processing chains to support the interpreter work substantially will be developed as addition to existing BB like B-3 • New VHR SAR and optical stereo data as a main asset for 3D-analysis of damage assessment , will be included in the process

Table B-6: Progress beyond the state of the art in G-MOSAIC themes

B.1.2.4 Performance/ Research Indicators

G-MOSAIC will perform a 2 level validation (as far as possible conform "Guidelines for the development and validation of pre-operational GMES Fast Track Services"):

- Scientific validation (product level)⇨ each thematic WP (service chains)
  - Assuring that service chains are set-up with scientifically sound methodologies, using state-of-the-art processing and data sources
  - Establish quantitative evaluation criteria for service chain performance, together with the procedures to ascertain these in (pre-)operational validation scenarios
  - Executed performance evaluation for each service chain according to the pre-determined procedures, e.g. a comparison between G-MOSAIC products and ground truth data (accuracy, efficiency, false alarm rate, etc…)
- Technical validation & User assessment (service level) ⇨ WP2100 and 3100 (service cases)
  - Focussed on the measurement of the user's satisfaction level, relevant to all the service lifecycle up to the service distribution through the dedicated platforms.
  - Performed through the definition and the evaluation of some objective indicators of system performances (e.g. accessibility of products, reliability, completeness, etc...) and subjective indicators (e.g. usefulness of the delivered services, perceived added value, possibility of integration within user's facilities, etc...).
  - Evaluation of pre-defined QoS indicators for scenario demonstration which are carried out in close collaboration with operational end-users.

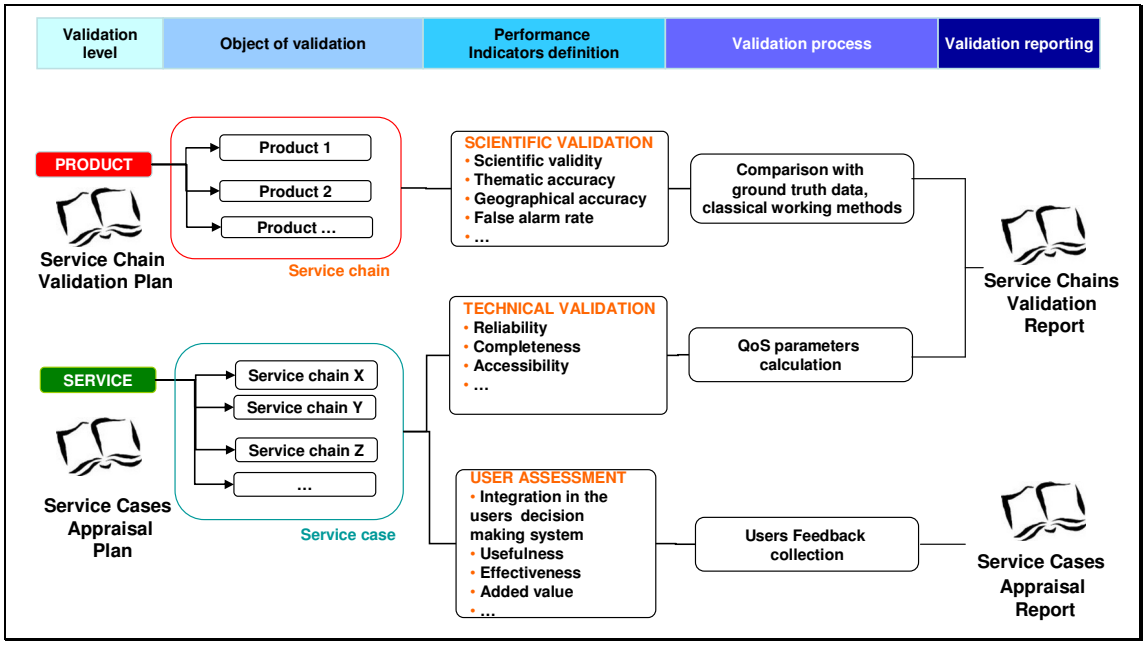

Fig. B-5: The G-MOSAIC Validation Process

- In case of new Products, validation may be made either
  - against sample of ground truth data

- against other (parallel) ways using photo interpretation or with space images with better resolution
- Integrating domain expert knowledge (with end-user, or external)

- Service Cases: each service has its own criteria
- Example of service validation
  - Integration into the user workflow
  - Delay of delivery
  - Relevance of the service (workflow improvements)
  - Comparison against existing methods and added value analysis
  - Number of false reports

The following scheme shows how the above validation approach is mapped into the project activities (WPs) and documentation.

Validation level	WPs	Documentation	Deliverables
Product (Scientific validation at Service chains level)	1230 2#00 3#00 5400	- Service chains Validation Plan - Service chains Validation Report	D2100.3, D3100.3 Service Validation and Appraisal plan D2100.6, D3100.6 Service Validation and Appraisal report D5400.2 Operational Common Portal – Implementation plan
Service (Technical validation & User assessment at Service cases level)	2100 3100 5400	- Service cases Validation & Appraisal Plan - Service cases Validation & Appraisal Report	D2100.3, D3100.3 Service Validation and Appraisal plan D2100.6, D3100.6 Service Validation and Appraisal report D5400.5 Platform Validation and Appraisal report

Table B-7: Validation levels vs project WP and documentation

B.1.3 S/T methodology and associated work plan

B.1.3.1 Overall Strategy of the Work Plan

To achieve the results, listed in par.B.1.1.1, the project is organised in:

- A **Management Work Package** (WP1000) to control the project in agreement with EC direction and signed contract.
- **two "Service Domains" Work Packages** (WP2000 and P3000), dealing with thematic service chains defined, implemented, and integrated into service cases, that are defined, deployed, and pre-operationally validated with Users. Service chains will be deployed and validated relevant to the following scenarios:
  - (WP2000) **intelligence and early warning**, i.e. those information services, that contribute to the analysis of the causes leading to regional crises, such as the evaluation of synthetic crisis indicators, the monitoring of critical assets, borders, routes, proliferation and illegal activities and their relations to regional crises
  - (WP3000) **crisis management operations**, i.e. those information services, that contribute to support the planning for EU intervention during crises, the EU intervention and citizen repatriation during crises, the crisis consequences management, reconstruction & resilience.
- **four "Transverse" Work Packages**, dealing with
  - (WP4000) the identification of Core Services for Security, within the framework of current status of GMES Initiative

- (WP5000) G-MOSAIC contribution to the general GMES governance and Architecture definition,
- (WP6000) the interface between the project activities, result, achievements and the end-user community
- (WP7000) G-MOSAIC Services dissemination on the Security related User Community

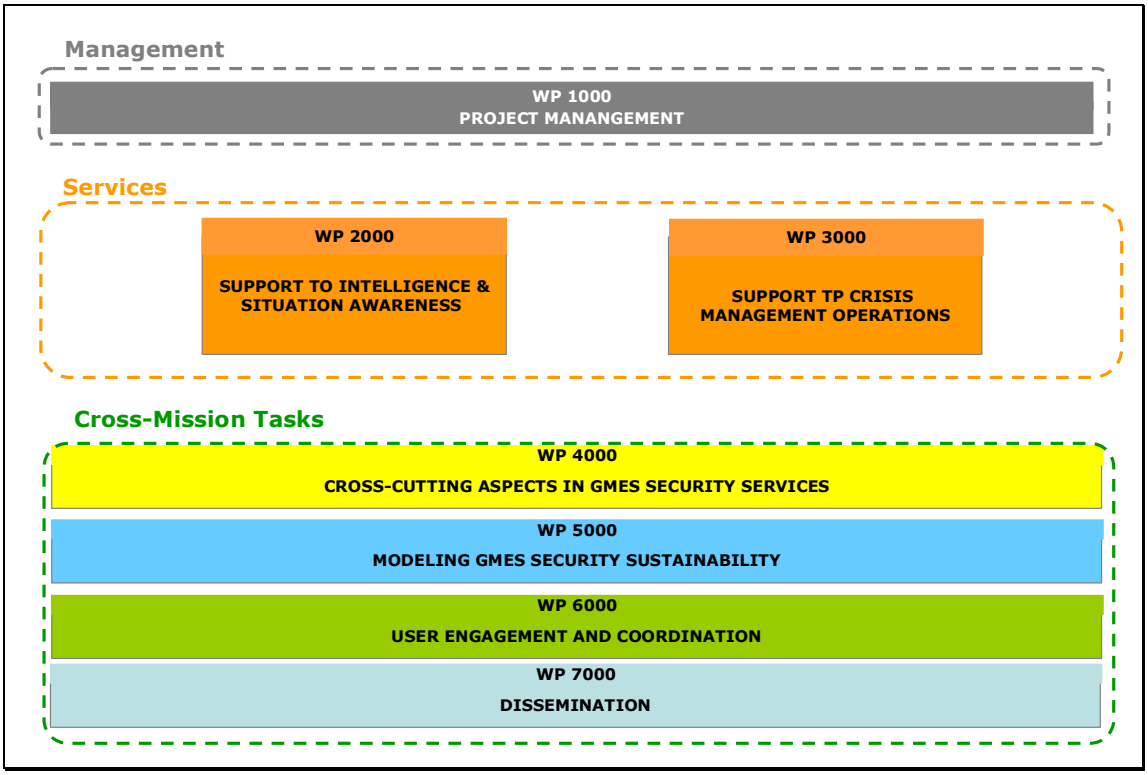

Fig. B-6: First level WBS

The Work Packages activities with the main expected results are listed and detailed in paragraph B.1.1. These WP activities are performed according to the following organization of the work:

- Administrative, legal and contract management
- Technical Management, including
  - Technical Coordination
  - Operational Coordination
  - Ground Segment Interface
  - Scientific Advisory Board
  - Transverse Activities Coordination
  - Dissemination.

The following Table B-8: G-MOSAIC WP Objectives reports a high level description of the Work Packages with their activities and objectives.

	MANAGEMENT
	WP1000 Project Management has the objective to manage the project in agreement with EC direction and signed contract. The tasks include: control of progress and performance, EC interface, delivery of documentation, technical management of the project, ESA interface (for EO data procurement), and project dissemination.
	SERVICES
New GMES services for security	
	WP2000 Support to intelligence and early warning has the objective to deploy and validate services scenarios in the domain of the support to intelligence and early warning, i.e. those information services, that contribute to the analysis of the causes leading to regional crises, such as the evaluation of synthetic crisis indicators, the monitoring of critical assets, borders, routes, proliferation and illegal activities and their relations to regional crises. The tasks include: definition of integrated service scenarios, deployment, operations and appraisal with users, assembly of final outputs of service chains and of methodologies implementation (including human interpretation) on a common gateways. Each theme contributes through the identification of building blocks, development of methodologies, implementation and test of service chains, deployment and operation of the specific service. **WP3000 Support to Crisis Management Operations** has the objective to deploy and validate services scenarios in the domain of the support to crisis management operations, i.e. those information services that contribute to support the planning for EU intervention during crises, the EU intervention and citizen repatriation during crises, the crisis consequences management, reconstruction & resilience. The tasks include: definition of integrated service scenarios, deployment, operations and appraisal with users, assembly of final outputs of service chains and of methodologies implementation (including human interpretation) on a common gateways. Each theme contributes through the identification of building blocks, development of methodologies, implementation and test of service chains, deployment and operation of the specific service.
	CROSS MISSION TASKS
Contribution to GMES sustainability	
	WP4000 Cross-cutting Aspects in GMES Security Services has the objective to provide the G-MOSAIC contribution to the identification of Core Services for Security, within the framework of current status of GMES Initiative as a whole, and to synthesize the global portfolio of services and methodologies (down-stream services) that can support the activities relevant to Crises Prevention and Management Operations. Moreover this WP contributes to the identification of recommendations for new monitoring sensors compliant to security related applications. The WP activities are performed according to the following organization of the work: • Addressed Policies • Cross-cutting analysis of GMES capabilities & Stakeholders identification • Security Services Portfolio Definition • Data Access Scenarios • Information Exchange: mapping and data exchange Standards **WP5000 Modelling GMES Security Sustainability** has the objective to contribute to define and evaluate the relevant global architecture for the GMES security services delivery that is compliant with the general GMES context, assets, stake-holders, with the specific security related requirements, with a sustainable provision funding model. In consistency with this GMES Security global architecture, a service prototype is developed and deployed during the project in order to provide the common gateway for services delivery to the users. The WP activities are performed according to the following organization of the work: • CONOPS & Capabilities • Sustainable Economic Models for security services • Contracts and QoS models • Service interoperability • Service Architecture for Security Modelling • Common platform for G-MOSAIC security services • Service Architecture for Security Evaluation

Users involvement	
	WP6000 User Engagement and Coordination has the objective to coordinate the interface between the project activities, result, achievements and the end-user community. This comprises: training the users in getting the best benefit from geo-spatial information services and related products; maintaining a constructive dialogue between the project and the end-user community through the organisation of interviews with user's representatives; support the dissemination activities. **WP7000 Dissemination** has the objective to disseminate knowledge on G-MOSAIC Services on the Security related User Community (DG ECHO, DG RELEX, EUMS, Council, National Ministries of Defence, National Ministries of Foreign Affairs, and any other stakeholders addressed by G-MOSAIC) and to contribute to build a political consensus among decision makers (executive and legislative, European and national) around GMES Services for Security

Table B-8: G-MOSAIC WP Objectives

User Community Involvement

The objective of WP6000 Users Engagement and Coordination WP is to stimulate and maintain a constructive dialogue between the G-MOSAIC project and the end-user community through the organisation of bi-lateral, multilateral interviews and information seminars with users' representatives (User Working Groups), in particular with the core users group. This WP provides guidance to the dissemination strategy and action plan (WP7000) for G-MOSAIC promotion to users and also to the training actions. This WP should involve the user community in interviews and workshops in order to be able to collect user needs and stimulate services definition. This activity should be performed with the support and involvement of the WP2000 and WP3000. This WP should be in charge to involve the Users in the SLA and SLS definition with the support and involvement of the WP6300 and to collects the Users reports during the Service Delivery and the Validation.

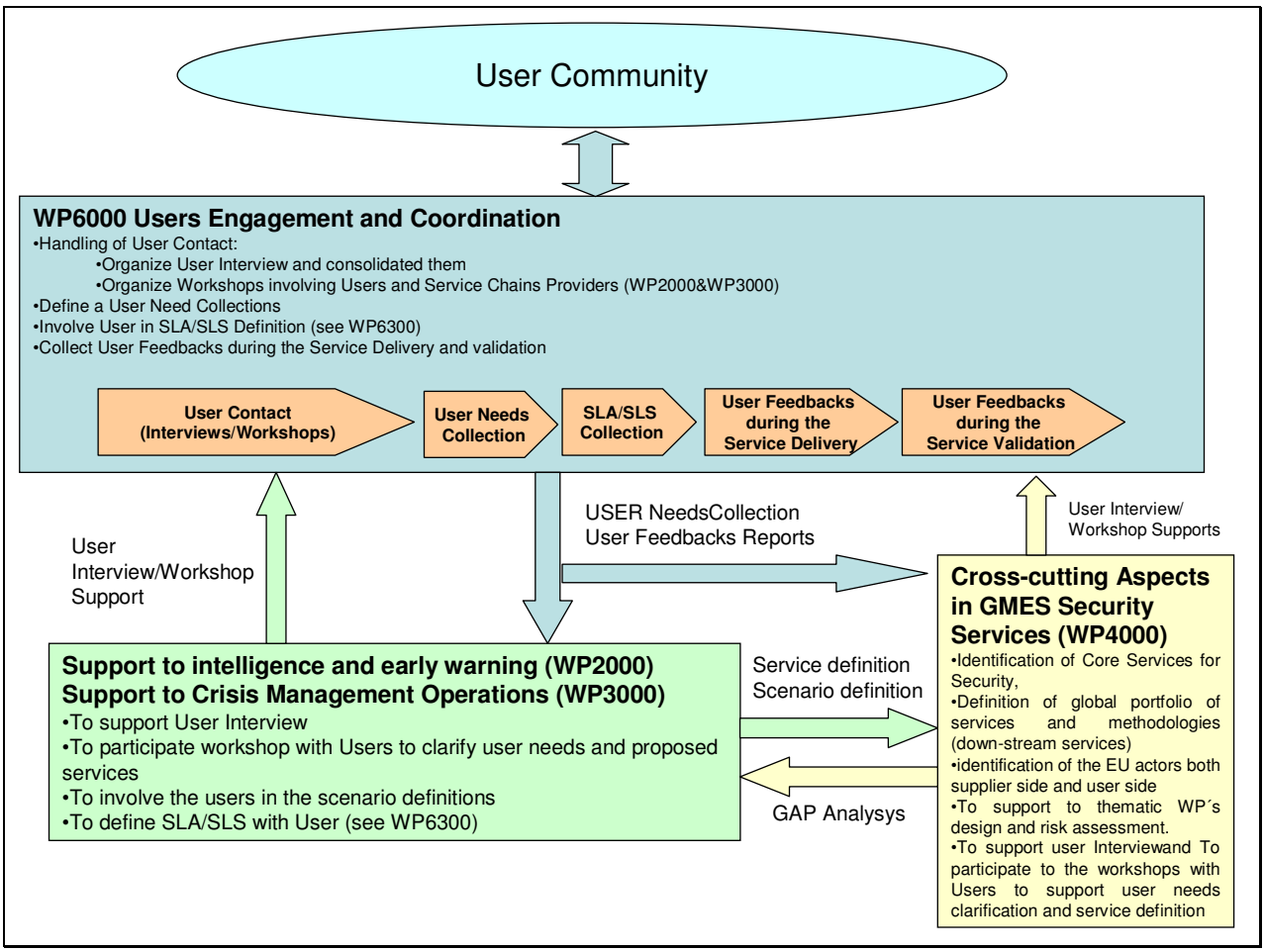

Fig. B-7: User Engagement and Coordination

The WP6000 should first identify actual users to be involved in each of the service trials proposed, then should collect indication of the responsibilities of these users for which the proposed services are relevant and finally should stimulate the user participation supporting the user involvement inside GMOSAIC WP processes such as:

- SLA definition (see WP6300)
- Validation constraints definitions (see WP2000, WP3000)
- Scenario definition (see WP2100, WP3100, WP4200),

The user participation should be acknowledged by a letter of commitment including, where applicable, an agreement on the terms under which user proprietary data can be accessed by the project partners.

In the table below are reported the users interested on the WP 2000 and WP 3000 services.

USER (Country)	WP2000						WP3000			
	2100 - integrated services	2200 - non-proliferation & treaties	2300 - crises indicators	2400 - critical assets	2500 - illegal activities	2600 - routes & borders	3100 - integerated service cases	3200 - planning for crises	3300 - geo-spatial support for crises management operations	3400 - conseuqnce managmenet, recosntruction and reslience
DG-RELEX (EU)	■		■	■	■	■	■	■		■
EUMS (EU)	■	■	■	■	■		■	■	■	■
SITCEN (EU)	■	■	■	■	■		■	■	■	
DG-DEVELOPMENT (EU)	■		■	■	■					
Ministero Affari Esteri (Unità Crisi) (IT)	■		■				■	■	■	■
French Military Intelligence (DRM) SAG (FR)	■		■	■		■	■	■	■	■
Centro Nacional de Inteligencia (E)	■		■	■		■	■	■	■	■
BKA (D)	■				■					
Global Witness (GB)	■				■					
Ministere de la Defense (F)	■		■	■			■	■	■	■
IAEA (Intern.)	■	■								
Italian MoD (IT)	■	■	■	■			■	■	■	■
Spanish MoD (E)	■			■			■	■	■	■
Spanish Foreign Affairs Min (E).	■		■				■	■	■	■
Aquas de Portugal (P)			■							
Ministério dos Negócios Estrangeiros (P)	■		■				■	■	■	■
German reconnaissance institutions	■			■		■	■		■	■
THW (D)							■	■	■	■
Military Cartography Section, Armed Forces (Austria)							■	■	■	

Table B-9: User and Services

EO data made available by ESA under the GSC-DA Grant

ESA is the beneficiary of an FP7 Coordination Action (CSA) whose main objective is to make available to the FP7 funded GMES related projects, including G-MOSAIC, the Earth Observation (EO) data they need to perform their activities. These data will be made available under certain licensing conditions.
In order to streamline the contractual relationship, the Commission Services consider that, for each project, the project coordinator shall be the only counterpart of ESA concerning matters related to EO data provision made available by ESA under the GSC-DA (GMES Space Component Data Access) Grant.
For the daily technical coordination with ESA GSC-DA the coordinator will be supported by the WP1220 Ground Segment Interface.

NON-EO data

The project budget includes specific figures for NON-EO data provisioning.

The needs and common synergies for the procurement of such data in the different G-MOSAIC tasks, will be managed by the WP4400, Non EO data Access Scenario

Time Plan and Study logic

G-MOSAIC overall duration is 3 years (36 months).

The project will perform its activities within two main temporal phases, as depicted in Figure 1-6.

Each phase basically includes the definition and deployment of a set of service cases, an incremental development and prototyping of the common portal for the G-MOSAIC security services, the output from the study activities related to G-MOSAIC portfolio identification.

On the other hand, architectural design, the economic model analysis and the evaluation tasks will carry on their activities only once during the whole project duration.

The followed approach is driven by ***Develop while Delivering*** concept (already introduced in Chapter B.1.2.2.2), i.e. the service cases will be deployed right after an understanding of User operational scenarios, and designing of service cases, and trying to engage users by means of the delivery of real products and services, that will be improved and tuned according to their needs, in iterative process.

The development of the Common Portal will follow the same logic by delivering a first release in the first phase with the aim of ensuring integration among service cases and a second release with the aim of prototyping architectural security solutions and tools.

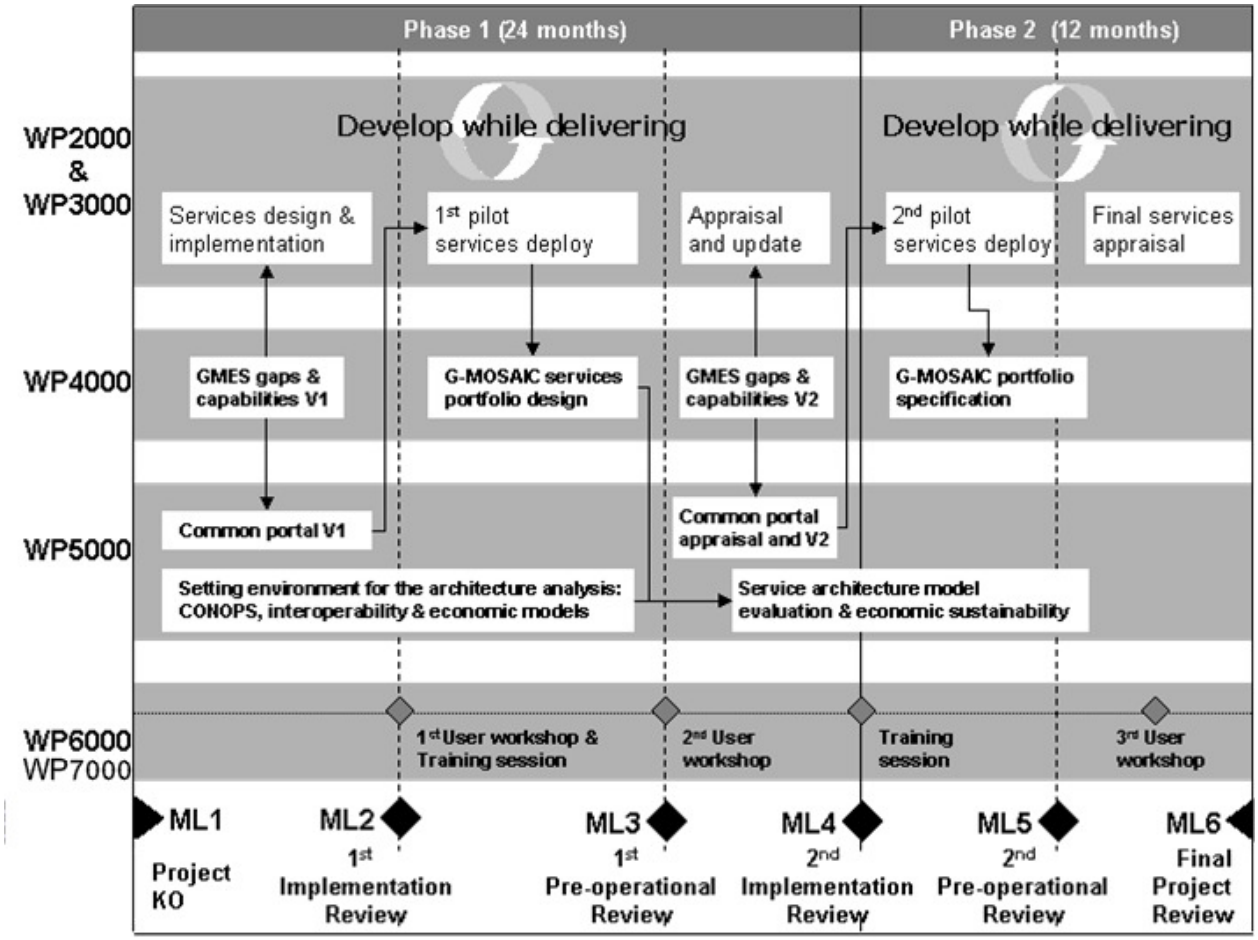

Fig. B-8: Study Logic

B.1.3.2 Timing of the WPs

B.1.3.2.1 GANTT chart

WBS	Nome attività	Start
ML1	KO - Project Kick Off	T0
Phase	Design & Implementation	
PR1	Scenario Review	T0+3
PR2	1st Design Review	T0+6
ML2	1st Implementation Review	T0+9
Phase	1° Pre-operational Deployment	
PR3	Annual Project Review & Periodical Pre-Operational	T0+12
PR4	Periodical pre-operational Review	T0+15
ML3	1st Pre-Operational Review	T0+18
Phase	Appraisal & Update for the 2° phase	
PR5	2nd Design Review	T0+21
ML4	Annual Project Review & 2nd Implementation Review	T0+24
Phase	2° Pre-operational Deployment	
PR6	Periodical pre-operational Review	T0+27
ML5	2nd Pre-Operational Review	T0+30
Phase	Final Appraisal & Project Result Review	
PR7	Final Appraisal	T0+33
ML6	Final Project Review	T0+36
WP1000	**Project Management**	**T0**
WP2000	**Support to intelligence and situation awareness**	**T0**
WP3000	**Support to Crisis Management Operations**	**T0**
WP4000	**Cross-cutting Aspects in GMES Security Services**	**T0**
WP5000	**Modeling GMES Security Sustainability**	**T0**
WP6000	**Stakeholder Engagement and Training**	**T0**
WP7000	**Dissemination**	

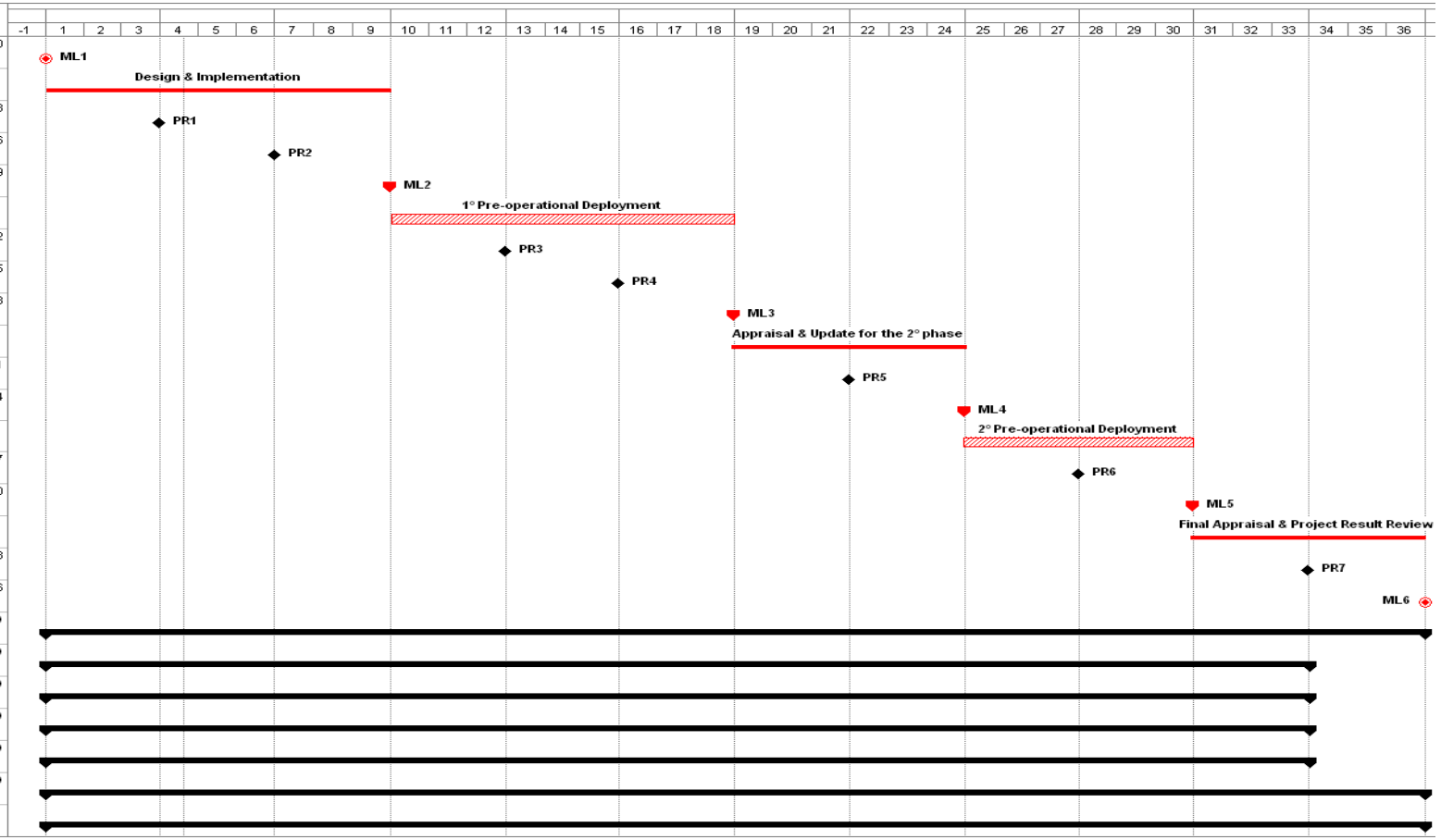

Fig. B-9: G-MOSAIC GANT

B.1.3.2.2 Components and their interdependencies

WorkPackage	Type	Activities
	Milestone	**Milestone 1 (ML1): Project Kick-Off**
WP2100/WP3100	Development	Specific user identification and service scenario definition
WP2x00/WP3x00	Development	Elements identification (already existing "building blocks", could be products from e.g. GMOSS or LIMES, service chains developed in different context e.g. in RESPOND, simple additional information) input from WP 4000
WP2x00/WP3x00	Development	Development of methodologies for security services (setting up of work-flows)
WP2x00/WP3x00	Development	Design of the Service chains (interoperable architecture)
WP4100	Development	Policy framework identification
WP4200	Development	Technological Capability & Gaps Analysis
WP4400	Development	Data needs identification
WP4500	Development	Applicable standards analysis
WP5100	Development	Operational scenarios and requirements for architectural modelling
WP5600	Development	Common portal for the G-MOSAIC security services version 1
	Milestone	**Milestone 2 (ML2): 1st Implementation Review**
WP2x00/WP3x00	Development	Service chains implementation on field
WP6200	Workshop	Users Training Session (1st)
WP2100/WP3100	Service provision	Service cases execution
WP4300	Development	G-MOSAIC Contribution to GMES services portfolio design
WP5100	Development	Threats analysis, common portal critical review
	Milestone	**Milestone 3 (ML3): 1st Pre-operational Review**
WP2x00/WP3x00	Development	Results assessments
WP2100/WP3100	Development	Collection of Users services appraisal for service quality acceptance
WP2100/WP3100	Development	Recommendation for the next phase
WP2100/WP3100	Development	Services and scenarios critical review
WP2x00/WP3x00	Development	Service chains re-tuning
WP4200	Development	Second iteration on capability & gaps analysis, standards, etc
WP5400/WP5500	Development	Definition of the environment for service architecture description and evaluation
WP5600	Development	Common portal for the G-MOSAIC security services version 2 with the Integration of security solutions and tools
	Milestone	**Milestone 4 (ML4): 2nd Implementation Review**
WP2x00/WP3x00	Development	Service chains implementation
WP6200	Workshop	Users Training Session (2nd)
WP2100/WP3100	Service provision	Service cases execution
WP4300	Development	Final identification of G-MOSAIC Contribution to GMES services portfolio design and specification
	Development	Recommendation on new sensors for security services
WP5200	Development	Report on cost & funding and on economic sustainability
WP5400/WP5500	Development	Interoperability analysis and transition views on Service Architecture for Security
WP5700	Development	GMES security architecture evaluation
	Milestone	**Milestone 5 (ML5): 2nd Pre-operational Review**
WP5300	Development	G-MOSAIC SLA/SLS template definition
WP5700	Development	Recommendation for future GMES security architecture definition
	Development	Results assessments
	Development	Recommendation for improvement beyond G-MOSAIC
	Development	Project results consolidation and synthesis
		Milestone 6 (ML6): Final Project Review

Table B-10: Interdipendences among project elements

B.1.3.3 Work package list

WP N.	*WP title*	*Type of activity*	*Lead beneficiary*	*Person monts*	*Start month*	*End month*
1000	Project Management		**TPZ**		T0	T0+36
1100	Consortium management	C_MGT	TPZ	59	T0	T0+36
1200	Technical Management	A_RTD			T0	T0+36
1210	Technical Coordination	A_RTD	TPZ	72	T0	T0+36
1220	Ground Segment Interface	A_RTD	DLR	11	T0+3	T0+36
1230	Scientific Advisory Board	A_RTD	JRC	10	T0+3	T0+36
2000	Support to intelligence and early warning		**Infoterra UK**		T0	T0+33
2100	Integrated service cases	A_RTD	Infoterra UK	133	T0	T0+33
2200	Proliferation and treaties	A_RTD	INDRA ESPACIO	80	T0+3	T0+33
2300	Crisis indicators	A_RTD	JRC	92	T0+3	T0+33
2400	Critical Assets	A_RTD	GMV	116	T0+3	T0+33
2500	Illegal activities	A_RTD	DLR	68	T0+3	T0+33
2600	Routes and borders	A_RTD	ITD	118	T0+3	T0+33
3000	Support to Crisis Management Operations		**TPZ**		T0	T0+33
3100	Integrated service cases	A_RTD	TPZ	66	T0	T0+33
3200	Planning for crisis	A_RTD	TPZ	102	T0+3	T0+33
3300	Geo-spatial support for Crisis Management Operations	A_RTD	EUSC	99	T0+3	T0+33
3400	Consequence management, reconstruction and resilience	A_RTD	DLR	36	T0+3	T0+33
4000	Cross-cutting Aspects in GMES Security Services		**INDRA ESPACIO**		T0	T0+33
4100	Addressed Policies	A_RTD	IAI	21	T0	T0+21
4200	Cross-cutting analysis of GMES capabilities & Stakeholders identification	A_RTD	INDRA ESPACIO	20	T0	T0+21
4300	Security Services Portfolio Definition	A_RTD	TPZ	34	T0+6	T0+33
4400	NON EO Data Access Scenario	A_RTD	TPZ	9	T0	T0+33
4500	Information exchange: mapping and data exchange standards	A_RTD	JRC	47	T0	T0+33

5000	Modelling GMES Security Sustainability		**TCF**		T0	T0+33
5100	CONOPS & Capabilities	A_RTD	Thales Alenia IT	26	T0	T0+24
5200	Sust. Funding Models for security services	A_RTD	LUISS	18	T0+6	T0+33
5300	Modelling of Service Architecture for Security	A_RTD	TCF	44	T0+6	T0+18
5400	Common Portal for G-MOSAIC security services	A_RTD	TPZ	61	T0	T0+33
6000	User Engagement, Coordination and Training		**EUSC**		T0	T0+36
6100	User Engagement and Coordination	A_RTD	EUSC	37	T0	T0+36
6200	Training	D_OTHER	EUSC	14	T0+6	T0+30
6300	SLA and SLS definition	A_RTD	INDRA ESPACIO	18	T0	T0+30
7000	Dissemination		**AN**		T0+3	T0+36
7000	Dissemination	D_OTHER	AN	9	T0+3	T0+36
	TOTAL			1.421		

Table B-11: Work Package List

B.1.3.4 Deliverables List

Deliverable N.	***Deliverable name***	***WP N.***	***Nature[1]***	***Diss.[2]***	***Lead Beneficiary***	***Delivery date***
WP1000	Project Management					
D1100.1	Annual Project Report #1	1100	R	CO	TPZ	T0+12
D1100.2	Annual Project Report #2	1100	R	CO	TPZ	T0+24
D1100.3	Annual Project Report #3	1100	R	CO	TPZ	T0+36
D1210.1	Consortium Plan	1210	R	CO	TPZ	T0+1
D1220.1	EO data access network plan, status and procedures	1220	R	CO	DLR	T0+6 T0+15 T0+27
D1230.1	Annual Scientific Advisory Board (SAB) Report	1230	R	CO	JRC	T0+12 T0+24 T0+36
WP2000	Support to intelligence and early warning					
D2100.1	Service Scenarios Definition Document	2100	R	CO	IT-UK	T0+3
D2100.2	Definition of the Methodology and specification for the Service Chains and Service Cases	2100	R	CO	IT-UK	T0+6 T0+21
D2100.3	Service Validation and Appraisal plan	2100	R	CO	IT-UK	T0+9 T0+24
D2100.4	Service Case(s) Demonstrator	2100	D	CO	IT-UK	T0+9 T0+24
D2100.5	Service Case(s) Demonstrator – Operational Manual	2100	R	CO	IT-UK	T0+9 T0+24
D2100.6	Service Validation and Appraisal report	2100	R	CO	IT-UK	T0+21 T0+33
D2200.1	[*Proliferation and Treaties*] Service Chain(s) Prototype	2200	P	CO	INDRA ESPACIO	T0+9 T0+24
D2300.1	[*Crisis Indicator*] Service Chain Prototype	2300	P	CO	JRC	T0+9 T0+24
D2400.1	[*Critical Assets*] Service Chain Prototype	2400	P	CO	GMV	T0+9 T0+24
D2500.1	[*Illegal Activities*] Service Chain Prototype	2500	P	CO	DLR	T0+9 T0+24
D2600.1	[*roots & borders*] Service Chain Prototype	2600	P	CO	Infoterra GmbH	T0+9 T0+24
WP3000	Support to Crisis Management Operations					
D3100.1	Service Scenarios Definition Document	3100	R	CO	TPZ	T0+3

[1] **R** = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other. For the deliverables classified as Demonstrator (D) or Prototype (P), the delivery shall consist of the issuing of the relative configuration item list.

[2] Dissemination: **PU** = Public; **PP** = Restricted to other programme participants (including the Commission Services). **RE** = Restricted to a group specified by the consortium (including the Commission Services). ;**CO** = Confidential, only for members of the consortium (including the Commission Services).

Deliverable N.	***Deliverable name***	***WP N.***	***Nature[1]***	***Diss.[2]***	***Lead Beneficiary***	***Delivery date***
D3100.2	Definition of the Methodology and specification for the Service Chains and Service Cases	3100	R	CO	TPZ	T0+6 T0+21
D3100.3	Service Validation and Appraisal plan	3100	R	CO	TPZ	T0+9 T0+24
D3100.4	Service Case(s) Demonstrator	3100	D	CO	TPZ	T0+9 T0+24
D3100.5	Service Case(s) Demonstrator – Operational Manual	3100	R	CO	TPZ	T0+9 T0+24
D3100.6	Service Chains Validation and Appraisal report	3100	R	CO	TPZ	T0+21 T0+33
D3200.1	[*planning for crisis*] Service Chain(s) Prototype	3200	P	CO	TPZ	T0+9 T0+24
D3300.1	[*crisis management operations*] Service Chain Prototype	3300	P	CO	EUSC	T0+9 T0+24
D3400.1	[*consequence management*] Service Chain Prototype	3400	P	CO	DLR	T0+9 T0+24
WP4000	Cross-cutting Aspects in GMES Security Services					
D4100.1	Reference Policies Identification	4100	R	CO	IAI	T0+6 T0+21
D4200.1	Building Block capabilities and GAP Analysis	4200	R	CO	INDRA ESPACIO	T0+3 T0+18
D4300.1	G-MOSAIC Security Services Portfolio Definition for Core and Downstream Services	4300	R	CO	TPZ	T0+12 T0+30
D4400.1	Non-EO data for security missions – Portfolio and Sources	4400	R	CO	TPZ	T0+6 T0+18
D4500.1	Standards for G-MOSAIC security scenarios	4500	R	CO	JRC	T0+6 T0+15 T0+30
D4500.2	Interoperability analysis of Service Architecture for Security	4500	R	CO	TAS	T0+6 T0+12 T0+24
WP 5000	Modelling GMES Security Sustainability					
D5100.1	Operational Concept Document	5100	R	CO	TAS-I	T0+6 T0+18
D5200.1	Report on scenario analysis of sustainable economic model and cost analysys	5200	R	CO	LUISS	T0+9 T0+24 T0+33
D5300.1	Modelling for service Architecture for Security	5300	R	CO	TCF	T0+12 T0+18
D5400.1	Operational Common Portal Specification	5400	R	CO	TPZ	T0+3
D5400.2	Operational Common Portal – Implementation plan	5400	R	CO	TPZ	T0+3 T0+21
D5400.3	Operational Common Portal	5400	P	CO	TPZ	T0+9 T0+24
D5400.4	Operational common portal and service platform guide	5400	R	CO	TPZ	T0+9 T0+24

Deliverable N.	***Deliverable name***	***WP N.***	***Nature[1]***	***Diss.[2]***	***Lead Beneficiary***	***Delivery date***
D5400.5	Platform Validation and Appraisal report	5400	R	CO	TPZ	T0+21 T0+33
WP 6000	User Engagement, Coordination and Training					
D6100.1	User Engagement Plan	6100	R	CO	EUSC	T0+3 T0+24
D6100.2	Report on user workshops	6100	R	CO	EUSC	T0+9 T0+24 T0+33
D6100.3	G-MOSAIC User needs collection	6100	R	CO	EUSC	T0+3
D6100.4	G-MOSAIC SLA/SLS Collection	6100	R	CO	EUSC	T0+9
D6200.1	Training plan and training assessment	6200	R	CO	EUSC	T0+9 T0+21 T0+30
D6300.1	G-MOSAIC SLA template definition	6300	R	CO	INDRA ESPACIO	T0 + 2 T0 + 6
D6300.2	G-MOSAIC SLS template definition	6300	R	CO	INDRA ESPACIO	T0 + 2 T0 + 6
WP 7000	Dissemination					
D7000.1	Dissemination Plan	7000	R	CO	AN	T0+6 T0+12 T0+24
D7000.2	Dissemination Material	7000	O	PU	AN	T0+1 (Logo, graphic charter including presentation template) T0+3 (Project WEB site) T0+6 (Leaflet) T0+12 (Poster / « Institutional » brochure) T0+18 (« Product » brochure) T0+24 (Leaflet/Poster)

Table B-12: Deliverables List

B.1.3.5 Work-Packages Description

The forms including the description of each Work-Package of G-MOSAIC is reported in the dedicated Section B.6 Work-Packages Description Forms,

B.1.3.6 Efforts for the full duration of the project

Particip. Number	Organisation Short Name	1000 Project Management	2000 Support to intelligence and early warning	3000 Support to Crisis Management Operations	4000 Cross-cutting Aspects in GMES Security Services	5000 Modelling GMES Security Sustainability	6000 User Engagement & Training	7000 Dissemination	Total Person/month
1	TPZ	114,9	42,0	65,0	18,0	22,0	6,5	3,0	**271,4**
2	INFOTERRA FRANCE	0,0	19,8	22,1	6,4	0,0	0,0	0,0	**48,3**
3	TCF	5,7	0,0	0,0	10,9	46,1	3,9	0,0	**66,6**
4	DLR	7,4	33,8	21,2	3,6	0,0	0,0	0,0	**65,9**
5	INDRA ESPACIO	3,9	60,9	26,5	20,2	0,0	7,4	0,0	**118,8**
6	GMV	0,0	42,3	28,3	7,1	0,0	0,0	0,0	**77,7**
7	EUSC	6,0	9,0	43,0	5,0	0,0	24,5	0,0	**87,5**
8	JRC	8,1	43,8	12,0	11,8	0,0	11,0	0,0	**86,8**
9	SRC	0,0	48,6	0,0	0,0	0,0	9,2	0,0	**57,8**
10	IAI	0,0	4,2	10,3	8,2	0,0	0,0	0,0	**22,8**
11	FRS	0,0	5,0	1,4	0,0	0,0	0,0	0,0	**6,4**
12	SCOR	0,0	26,2	0,0	0,0	0,0	0,0	0,0	**26,2**
13	THAS-I	0,0	0,0	0,0	4,2	32,3	0,0	0,0	**36,6**
14	THAS-F	0,0	0,0	0,0	10,0	0,0	0,0	0,0	**10,0**
15	AN	0,0	0,0	0,0	0,0	6,1	6,1	6,1	**18,3**
16	Astrium SAS	0,0	15,3	6,3	0,0	0,0	0,0	0,0	**21,6**
17	Infoterra UK	6,3	20,1	1,6	3,9	5,6	0,0	0,0	**37,5**
18	ITD	0,0	18,8	7,6	0,0	0,0	0,0	0,0	**26,3**
19	TUBAF	0,0	17,0	0,0	0,0	0,0	0,0	0,0	**17,0**
20	TNO	0,0	10,1	4,6	0,0	0,0	0,0	0,0	**14,7**
21	IMAA	0,0	0,0	0,0	8,9	0,0	0,0	0,0	**8,9**
22	UNIBAS	0,0	19,1	0,0	0,0	0,0	0,0	0,0	**19,1**
24	EUROSENSE	0,0	11,2	0,0	0,0	0,0	0,0	0,0	**11,2**
25	SYS	0,0	0,0	0,0	0,0	0,0	0,0	0,0	**0,0**
26	LUISS	0,0	0,0	0,0	0,0	10,3	0,0	0,0	**10,3**
27	SKF	0,0	14,1	19,0	0,0	0,0	0,0	0,0	**33,2**
28	IST	0,0	16,2	0,0	0,0	0,0	0,0	0,0	**16,2**
29	JR	0,0	0,0	10,2	0,0	0,0	0,0	0,0	**10,2**
30	PLUS-Z_GIS	0,0	9,9	13,3	3,3	0,0	0,0	0,0	**26,5**
32	PLANETEK	0,0	0,0	6,3	0,0	10,2	0,0	0,0	**16,5**
33	CRPSM	0,0	47,1	0,0	0,0	0,0	0,0	0,0	**47,1**
34	GISAT	0,0	13,5	4,1	0,0	0,0	0,0	0,0	**17,7**
35	KCL	0,0	22,4	0,0	9,6	0,0	0,0	0,0	**32,0**
36	SYNESYS	0,0	0,0	0,0	0,0	7,2	0,0	0,0	**7,2**
37	Adelphi	0,0	25,1	0,0	0,0	0,0	0,0	0,0	**25,1**
39	SISTEMATICA	0,0	0,0	0,0	0,0	10,3	0,0	0,0	**10,3**
40	Swisspeace	0,0	11,4	0,0	0,0	0,0	0,0	0,0	**11,4**
Total		**152,3**	**607,0**	**303,0**	**131,1**	**150,1**	**68,5**	**9,1**	1420,9

Table B-13: Summary of Staff Effort

Activity Type vs participants	TPZ	INFOTERRA FRANCE	TCF	DLR	INDRA ESPACIO	GMV	EUSC	JRC	SRC	IAI	FRS	SCOR	TAS-I	TAS-F	AN	Astrium SAS	Infoterra UK	ITD	TUBAF	TNO	IMAA	UNIBAS	EUROSENSE	SYS	LUISS	SKF	IST	JR	PLUS	PLANETEK	CRPSM	GISAT	KCL	SYNESYS	Adelphi	SISTEMATICA	Swisspeace
RTD																																				
1210	56,1	-	5,7	-	3,9	-	-	-	-	-	-	-	-	-	-	-	6,3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1220	-	-	-	5,4	-	-	6,0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1230	-	-	-	2,0	-	-	-	8,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2100	12,0	5,1	-	4,6	8,2	8,3	2,0	5,7	6,1	4,2	5,0	-	-	-	-	15,3	15,4	3,3	-	-	-	-	-	-	4,1	-	-	-	-	-	-	22,4	-	11,3	-	-
2200	8,0	-	-	9,7	26,5	-	7,0	11,4	-	-	-	-	-	-	-	-	-	-	17,0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2300	-	14,7	-	-	-	-	-	17,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16,2	-	9,9	-	-	8,5	-	-	13,8	-	11,4
2400	-	-	-	-	12,4	34,0	-	-	-	-	-	-	-	-	-	-	-	6,3	-	5,5	-	19,1	5,2	-	-	10,1	-	-	-	-	23,6	-	-	-	-	-	-
2500	11,0	-	-	19,4	13,8	-	-	9,6	-	-	-	-	-	-	-	-	4,7	-	-	4,6	-	-	-	-	-	-	-	-	-	-	-	5,1	-	-	-	-	-
2600	11,0	-	-	-	-	-	-	-	42,5	-	-	26,2	-	-	-	-	-	9,2	-	-	-	-	6,0	-	-	-	-	-	-	-	23,6	-	-	-	-	-	-
3100	19,0	4,4	-	4,6	-	-	9,0	-	-	10,3	1,4	-	-	-	-	6,3	1,6	-	-	-	-	-	-	-	-	9,5	-	-	-	-	-	-	-	-	-	-	-
3200	26,0	-	-	-	11,1	14,2	7,0	6,0	-	-	-	-	-	-	-	-	-	7,6	-	-	-	-	-	-	-	9,5	-	10,2	-	6,3	-	4,1	-	-	-	-	-
3300	20,0	17,7	-	-	15,4	14,2	27,0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,8	-	-	-	-	-	-	-	-
3400	-	-	-	16,6	-	-	-	6,0	-	-	-	-	-	-	-	-	-	-	-	4,6	-	-	-	-	-	-	-	-	8,5	-	-	-	-	-	-	-	-
4100	-	-	-	-	-	-	3,0	-	-	8,2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,6	-	-	-	-	-
4200	4,0	-	-	-	12,6	-	-	-	-	-	-	-	-	-	-	-	3,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4300	7,0	6,4	-	3,6	7,6	7,1	2,0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4400	7,0	-	2,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4500	-	-	8,8	-	-	-	-	11,8	-	-	-	-	4,2	10,0	-	-	-	-	-	-	8,9	-	-	-	-	-	-	-	3,3	-	-	-	-	-	-	-	-
5100	-	-	-	-	-	-	-	-	-	-	-	-	23,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,5	-	-	-	-	-	-	-
5200	-	-	2,0	-	-	-	-	-	-	-	-	-	-	-	6,1	-	-	-	-	-	-	-	-	-	10,3	-	-	-	-	-	-	-	-	-	-	-	-
5300	-	-	37,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7,2	-	-	-	-
5400	22,0	-	7,0	-	-	-	-	-	-	-	-	-	8,5	-	-	-	5,6	-	-	-	-	-	-	-	-	-	-	-	7,7	-	-	-	-	-	10,3	-	-
6100	-	-	-	-	-	-	16,0	5,4	9,2	-	-	-	-	-	6,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6300	6,5	-	3,9	-	7,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Activity Type vs participants	TPZ	INFOTERRA FRANCE	TCF	DLR	INDRA ESPACIO	GMV	EUSC	JRC	SRC	IAI	FRS	SCOR	TAS-I	TAS-F	AN	Astrium SAS	Infoterra UK	ITD	TUBAF	TNO	IMAA	UNIBAS	EUROSENSE	SYS	LUISS	SKF	IST	JR	PLUS	PLANETEK	CRPSM	GISAT	KCL	SYNESYS	Adelphi	SISTEMATICA	Swisspeace	
tot RTD	209,6	48,3	66,6	65,9	118,8	77,7	79,0	81,2	57,8	22,8	6,4	26,2	36,6	10,0	12,2	21,6	37,5	26,3	17,0	14,7	8,9	19,1	11,2	-	10,3	33,2	16,2	10,2	26,5	16,5	47,1	17,7	32,0	7,2	25,1	10,3	11,4	1.
DEMO																																						
tot DEMO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MGT																																						
1100	58,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
tot MGT	58,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
OTH																																						
6200	-	-	-	-	-	-	8,5	5,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7000	3,0	-	-	-	-	-	-	-	-	-	-	-	-	-	6,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
tot OTH	3,0	-	-	-	-	-	8,5	5,7	-	-	-	-	-	-	6,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TOT BENEFICIARIES	271,4	48,3	66,6	65,9	118,8	77,7	87,5	86,8	57,8	22,8	6,4	26,2	36,6	10,0	18,3	21,6	37,5	26,3	17,0	14,7	8,9	19,1	11,2	-	10,3	33,2	16,2	10,2	26,5	16,5	47,1	17,7	32,0	7,2	25,1	10,3	11,4	1.

Table B-14: indicative efforts per activity type per beneficiary

B.1.3.7 List of Milestones and planning of reviews

The following table lists all the relevant milestones of the projects. The "means of verification" column establish a relation between milestones and completion of activities for each of the project WPs. Associated deliverables are listed in the WPD tables.

Milestone number	Milestone name	Work package(s) involved	Expected date	Means of verification
ML1	KO – Project Kick Off	All	T0	Start of project activities according to the project master plan
PR1	Scenario Review	WP1000 (All) WP2100 WP3100 WP4200 WP5400 WP6100	T0+3	Service Scenario definition (WP2100, WP3100) User Engagement Plan (WP6100) GMES Capabilities and Technological State-of-Art analysis (WP4200, WP5400) Building Blocks identification (WP4200)
PR2	1st Design Review	WP1000 (All) WP2000 (All) WP3000 (All) WP4000 (All except for WP4300) WP5400	T0+6	Service Chains specification (WP2100, WP3100) Service Cases and Appraisal methodology definition (WP2100, WP3100) Common Portal Implementation Plan (WP5400) Security EO data and non-EO data requirements compilation (WP4200) Standards for G-MOSAIC security scenarios (WP400) Interoperability concepts for common gateway for service delivery (WP4500)
ML2	1st Implementation Review	WP1000 (All) WP2000 (All) WP3000 (All) WP4000 (All except for WP4300) WP5400/5200 WP6000 (All)	T0+9	Service Chains prototypes ready to be run in Service Cases for the first phase pre-operational deployment (WP2x00 x=2 to 6, WP3x00 x=2 to 4) First GMES Security Services Perception Analysis (WP6100) Common portal V1 prototype ready to integrate and deliver pilot services (WP5400) Operational Plan (WP1210) User Training Plan (WP6200) Economic Roles of Stakeholders and Stakeholder Commonalities analysis (WP5200) User Workshop (WP7000, WP6100)
PR3	Annual Project Review & Periodical Pre-Operational Review	WP1000 (All) WP2000 (All) WP3000 (All) WP4300 WP5000 (except for WP5700) WP6100	T0+12	Pre-operational pilot services periodical validation First GMES Security Services Perceptions analysis (WP6100) First identification of G-MOSAIC Contribution to Security Core Services Portfolio Definition (WP4300) First fully-operational GMES Security Services Costs Analysis (WP5200) First identification of SLA and SLS (WP6300)
PR4	Periodical pre-operational Review	WP1000 (All) WP2000 (All) WP3000 (All)	T0+15	Pre-operational pilot services periodical validation G-MOSAIC Security Services Portfolio Specifications (WP4300)

Milestone number	Milestone name	Work package(s) involved	Expected date	Means of verification
		WP4300 WP5200 WP5300		Requirements for Architecture description of GMES Security (WP5300)
ML3	1st Pre-Operational Review	All WPs	T0+18	1st Pre-operational pilot services validation Building Blocks identification (WP4200) Definition of the environment for Service architecture description and evaluation: Methodology, organisation, process, and tools (WP5300) Interoperability analysis and transition views on Service Architecture for Security (WP4500)
PR5	2nd Design Review	All WPs except for WP5300	T0+21	Updated Service Chains, Service Cases and Common Portal specifications (WP2000, WP3000 and WP5400) Agreements with EO and non EO data sources – portfolio definition (WP4400) User Training Plan for the 2nd pre-operational pilot Policies identification (WP4100)
ML4	Annual Project Review & 2nd Implementation Review	WP1000 (All) WP2000 (All) WP3000 (All) WP4300 to WP4500 WP5200, , WP5400 WP6000 (All) WP7000	T0+24	Service Chains prototypes ready to be run in Service Cases for the second phase pre-operational deployment (WP2000, WP3000) Common portal V2 prototype ready to integrate and deliver pilot services (WP5400) Users workshop (WP6100, WP7000) User Engagement plan (WP6200) GMES Security Services Perceptions intermediate results (WP6100) Interoperability analysis and transition views on Service Architecture for Security (WP4500) Intermediate report on cost & funding and on economic sustainability (WP5200)
PR6	Periodical pre-operational Review	WP1000 (All) WP2000 (All) WP3000 (All)	T0+27	Pre-operational pilot services periodical validation GMES Security Architecture Evaluation Results (WP5700) EO data access network status and procedures (WP1220)
ML5	2nd Pre-Operational Review	WP1000 (All) WP2000 (All) WP3000 (All) WP4500 WP6300	T0+30	2nd Pre-operational pilot services validation Final identification of G-MOSAIC Contribution to GMES services portfolio design and specification (WP4300) G-MOSAIC SLA/SLS template definition (WP6300) Standard Implementation review (WP4500)
PR7	Final Appraisal	WP1000 (All) WP2000 (All) WP3000 (All) WP4300	T0+33	Results assessment User Workshop (WP7000, WP6100) G-MOSAIC Security Portfolio Specification (WP4300)

Milestone number	Milestone name	Work package(s) involved	Expected date	Means of verification
		WP4400 WP4500 WP5200 WP5400 WP5700 WP6100		Recommendation for on new sensors for security services (Next Generation of Satellite), for GMES Security Target Architecture , for GMES Security Services standards (WP4400, WP5700, WP4500) Sustainable economic model Specification (WP5200) User feedbacks on G-MOSAIC platform (WP5400)
ML6	Final Project Review	All WPs	T0+36	Project results consolidation and synthesis (WP1210) GMES Security Services Perceptions final results (WP6100)

Table B-15: List of Milestones

Tentative schedule of project reviews			
Review no.	**Tentative timing, i.e. after month X = end of a reporting period [3]**	***planned venue of review***	***Comments , if any***
1	After project months: 12	**Brussels**	
2	After project months: 24	**Rome**	
3	After project months: 36	**Brussels**	

Table B-16: Tentative schedule of project reviews

B.2 Implementation

B.2.1 Management structures and procedures

B.2.1.1 Project management principles

Project management activities deals with administrating the interfaces with the Commission, administrating the interfaces with the partners of the Consortium, performing the project control and identifying proactive/reactive measures to have project risks under control. The approach to project management will be applied to all phases of the project.

The management principles are base on four cornerstones:

i. coordinating teams and partners activities, encouraging cooperation of multinational components (from industry, SME, research and representatives of users organisations)

ii. tracing actions as specific items to be managed

iii. handle progress reports as common way to share visibility on information and project development

[3] Month after which the review will take place. Month 1 marking the start date of the project, and all dates being relative to this start date.

iv. an agreed process for reviewing project outputs and handle the approval process

Prior to the start of the project, Telespazio senior management will appoint a project manager (coordinator) and a project office for carrying out the management activities. The project office will be constituted by a technical coordinator an administrative and financial officer and a quality assurance manager that will assist the project manager for the day-to-day work.

The Coordinator will have direct access to the Telespazio senior management.

Further, Telespazio as Coordinator will present at an early stage of the project, a Consortium Plan document, based on:

1. Telespazio company guidelines tailored according to the complexity of the project itself and
2. the contents of the Description of Work document, as contractual reference based on this present document, where key information are presented in terms of:
    - Project Organisation and Organisation Breakdown Structure
    - Consortium relationship with partners
    - Work to be accomplished in terms of Work Breakdown Structure and Work Packages description
    - Project schedule and milestone plan
    - Deliverables Items list

The approach here proposed to project management is compliant with the ESA Management standards, has achieved ISO 9001:2000 certification and is currently undergoing CMMI assessment.

B.2.1.2 Organisational structure and decision making

The complexity of the project due to both the large consortium and the ambitious objectives, calls for an adequate organisational structure able to assure the degree of integration required through a reliable day-by-day management supported by an effective decision-making mechanisms.

The organisational structure of the Consortium shall comprise the following Consortium Bodies:

(a) **General Assembly** as the ultimate decision-making body of the Consortium

(b) **Executive Board** as the supervisory body for the execution of the Project which shall report to and be accountable to the General Assembly

(c) **Work Packages Committees** as management groups for each 1st level Work Package.

(d) **Coordinator,** as the legal entity acting as the intermediary between the Parties and the European Commission. The Coordinator shall, in addition to its responsibilities as a Party, perform the tasks assigned to it as described in the Grant Agreement and the Consortium Agreement.

(e) The ***Management Support Team*** assists the Executive Board and the Coordinator.

(f) The ***Ground Segment Interface***, as coordination body between the project and ESA DAP for what concern the procurement of all the EO data to be used in the project.

(g) The ***User Advisory Board*** , main advisory body, external to the Consortium composed by representatives of the User Community addressed by the project

(h) The ***Scientific Advisory Board***, which is established to advising on major technological choices and Scientific issues

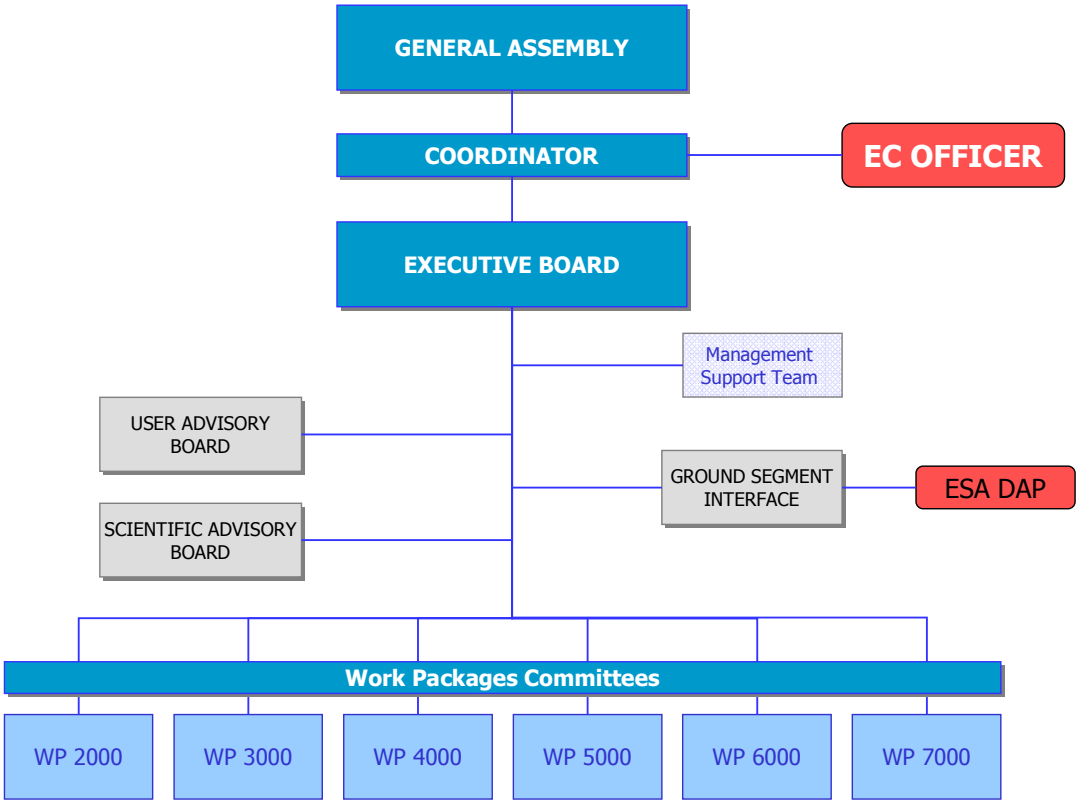

Fig. B-10: Project Management Structure

The organisational structure depicted above, its composition and internal rules are established in the Consortium Agreement document.

Here a brief summary is given.

General Assembly

The General Assembly shall consist of one representative of each Party (hereinafter General Assembly Member).

The Coordinator shall chair all meetings of the General Assembly, unless decided otherwise in a meeting of the General Assembly.

Decisions

The following decisions shall be taken by the General Assembly:

Content, finances and intellectual property rights

- Proposals for changes to Annex I of the Grant Agreement to be agreed by the European Commission
- Changes to the Consortium Plan (including the Consortium Budget)
- Maintenance of the Consortium Agreement

Evolution of the Consortium

- Entry of a new Party to the Consortium and approval of the settlement on the modalities and conditions of the accession of such a new Party

- Withdrawal of a Party from the Consortium and the approval of the settlement on the modalities and conditions of the withdrawal
- Declaration of a Party to be a Defaulting Party
- Corrective measures to be required from a Defaulting Party
- Termination of a Defaulting Party's participation in the Consortium and measures relating thereto
- Proposal to the European Commission for a change of the Coordinator
- Suspension of all or part of the Project
- Termination of the Project and/or the Consortium Agreement

All rules and terms related to the General Assembly (e.g. meetings and voting) are established in the Consortium Agreement

Executive Board

The Executive Board shall consist of the Coordinator and all of the 1st level Work Packages Leaders as appointed by the General Assembly (hereinafter Executive Members).

The Coordinator shall chair all meetings of the Executive Board, unless decided otherwise.

Tasks

The Executive Board shall prepare the meetings, propose decisions and prepare the agenda of the General Assembly.

It shall seek a consensus among the Parties.

The Executive Board shall be responsible for the proper execution and implementation of the decisions of the General Assembly.

The Executive Board shall monitor the effective and efficient implementation of the Project.

In addition, the Executive Board shall collect information at least every 6 months on the progress of the Project, examine that information to assess the compliance of the Project with the Consortium Plan and, if necessary, propose modifications of the Consortium Plan to the General Assembly.

The Executive Board shall:
- initiate, coordinate and have organised the Work Package(s)
- agree on the members of the Management Support Team, upon a proposal by the Coordinator
- support the Coordinator in preparing meetings with the European Commission and in preparing related data and deliverables
- prepare the content and timing of press releases and joint publications by the Consortium or proposed by the European Commission in respect of the procedures of the Grant Agreement Article II 30.3.

All rules and terms related to the Executive Board are established in the Consortium Agreement.

Work Packages Committees

A Work Package Committee shall consist of one representative of each Party having a task within the respective Work Package (hereinafter Work Package Member).

A Work Package Leader shall chair all meetings of a Work Package Committee.

Tasks

Each Work Package Committee shall manage the respective Work Package, in particular with regard to:

- the timely delivery of reports and Work Package results to the Executive Board and the Coordinator

- formulating an implementation plan for the activities within the Work Package for the future period, which can imply proposing to the Executive Board changes to the Consortium Plan and/or this Annex I of the Grant Agreement
- making proposals to the Executive Board for the admission of new Parties to the Grant Agreement and to the Consortium Agreement in order for said new Parties to participate in the Work Package
- alerting the Executive Board and the Coordinator in case of delay in the performance of the Work Package or in case of breach of responsibilities of any Party under said Work Package
- analysing and documenting, at the request of the Executive Board, a presumed breach of responsibilities of a Party under the Work Package and preparing a proposal of remedies to the Executive Board
- deciding upon any exchange of tasks and related budgets between the Parties in a Work Package when such exchange has no impact beyond the scope of the Work Package and its budget.

Work Package Leader

The Work Package Leader of each 1st level Work Package is appointed by the General Assembly.

The Work Package Leader shall have the following functions only:

- communicating any plans, deliverables, documents and information connected with the Work Package between its members and, if relevant, to the Executive Board
- submitting the implementation plan of the Work Package to the Executive Board for review and proposing an update of the Consortium Plan.
- coordinating on a day-to-day basis the progress of the technical work under the Work Package
- following up decisions made by Consortium Bodies insofar as they affect the Work Package
- advising the Coordinator of any discrepancy with the Consortium Plan, including any delay in delivery.

Coordinator

The Coordinator, supported by its Project Office Team and by the Management Support Team, will be in charge of performing all technical / management activities, insuring that the Project results are compliant with the given requirements in this Annex I of the Grant Agreement.

The Coordinator has responsibility for schedule and cost control and will ensure the correct and satisfactory execution of all the project tasks assigned to the partners.

The Coordinator will participate to all planned meetings and reviews and will authorise the issuing of all documentation produced in the frame of the Contract.

In particular, the Coordinator shall be responsible for:

- monitoring compliance by the Parties with their obligations
- keeping the address list of members and other contact persons updated and available
- collecting, reviewing to verify consistency and submitting reports and other deliverables (including financial statements and related certifications) to the European Commission
- transmitting documents and information connected with the Project, including copies of Accession documents and changes of contact information to and between Work Packages Leaders, as appropriate, and any other Parties concerned
- administering the Community financial contribution and fulfilling the financial tasks
- Management of the ESA GSC-DA Grant:

The Coordinator shall be the only counterpart of ESA concerning matters related to EO data provision made available by ESA under the GSC-DA Grant.
As a consequence, the coordinator shall be the sole legal entity negotiating with ESA, applying for a license and signing the associated contractually binding documents with ESA.
The coordinator should then ensure that all the project partners who need access to the data receive this under the same conditions. Thus, the coordinator will issue sublicenses to project partners. Once the sublicenses have been concluded, technical arrangements will be made so that project partners will obtain the data directly via a practicable interface, i.e. without necessarily going through the project coordinator.

Management Support Team

The Management Support Team shall be proposed by the Coordinator. It shall be appointed by the Executive Board and shall assist and facilitate the work of the Executive Board and the Coordinator for executing the decisions of the General Assembly as well as the day-to-day management of the Project.

Ground Segment Interface

The Ground Segment Interface body shall ensure the coordination with the ESA DAP assuring that that the supply with earth observation satellite data for the goals, research and the services of the G-MOSAIC project is properly organised primarily on the technical level.

It shall assist and facilitate the work of the Executive Board and the Coordinator for executing the decisions of the General Assembly.

Organisation, objectives and tasks are defined in the WP1220 Ground Segment Interface.

User Advisory Board

The project organisational structures, i.e. the GA, EB and Coordinator may be supported in their strategic management by an external advisory body composed by external experts and qualified User's representatives, recognised for their expertise in the field of the project, and who can act as an evaluation consultative body to:

- advise on project orientations,
- evaluate the work programme of work-packages and the results achieved,
- make proposals on any S&T issue at the request of the Executive Board

It shall assist and facilitate the work of the Executive Board and the Coordinator for executing the decisions of the General Assembly.

UAB Organisation for objectives and tasks is carried out in the WP1210, Technical Coordination with the support of WP6100, User Engagement and Coordination.

Scientific Advisory Board

The Scientific Advisory Board supervises the scientific aspects of the work to be carried out in G-MOSAIC. It judges the scientific soundness of the proposed methodology and advices on potential alternatives. The SAB will coordinate scientific publications deriving from G-MOSAIC and represents the project in scientific panels addressing security application that are within the G-MOSAIC scope.

It shall assist and facilitate the work of the Executive Board and the Coordinator for executing the decisions of the General Assembly.

Organisation, objectives and tasks are defined in the WP1230 Scientific Advisory Board.

B.2.1.3 Project monitoring

Project schedule and progress monitoring will be performed by the Coordinator on the basis of the proposed Work Breakdown Structure, Work Packages and Milestones formally agreed with the Commission in the Contract.

The basic tasks performed in the frame of Project Control can be summarised as follows:

- Ensuring a common baseline planning and understanding of schedule requirements, priorities and objectives;
- Development and co-ordination of plans and schedule;
- Rapid checking, comparing and monitoring of programme activities progress against baseline schedules;
- Maintaining up to date schedule status;
- Proposing to program management, initiating and taking of corrective actions as a result of conclusions drawn by project analysis and monitoring;
- Providing summary information for reporting to the Commission.

The successful and efficient implementation of the technical work outlined in this proposal is based on structuring work and identifying all constituent activities. This is achieved through the use of the following elements:

- the Project Schedule, including critical path master network;
- the Work Breakdown Structure, that identifies each item of work;
- the individual Work Packages.

Existing Telespazio procedures and practices will be used to control the important elements of Cost/Budget, schedule and performance and assure that they conform to submitted forecasts.

B.2.1.4 Handling the "Security" Issue

Several aspects of the word "Security" shall be handled during G-MOSAIC. Although, in the project, many actors and activities will take into account sensitivity of data, security of systems, the Security Issues will be managed at coordination level and the processes relevant to Security issues that the project will set up, will be controlled by the Executive Board, in agreement with the User Advisory Board. Some general statements can be given here:

User management and user licences

Certain missions/ certain sensor modes require a strict knowledge of the user/licensee of the data. The user cannot be only a consortium but shall be a legal entity based in a known country. It needs to be clarified, whether one legal entity can sign a licence agreement on behalf of the members of a consortium or interest group (independent of their country of origin) or whether each data user in the consortium needs to be identified.

Ordering and Tasking Satellite data

Certain missions/ certain sensors might impose restrictions for the ordering of data. Possible restrictions can be checked by the following questions:

- Which user is ordering the data, has he special permissions or restrictions? (see above)
- Is the sensor critical (e.g. SAR or hyper spectral and very high resolution)?
- Is the ground station, receiving the data critical?
- Is the area to be images critical?

Current assumptions are that the majority of all requests are uncritical in this matrix. If one of the above issues is critical, certain restrictions may apply, ranging from delay in delivery up to denial of delivery.

For G-MOSAIC this means that some sensitive requests (e.g. border control in Iran, trafficking in Afghanistan, etc.) might be sensitive and the execution cannot be performed under near real time conditions or even denied using certain satellite data.

Data and information encryption/Security

Data downlink from some missions is encrypted. This is normally handled within the ground segment and of no concern of the end user. The end user receives un-encrypted information. However, the process of delivery of data to the end user must ensure that nobody can access the data, which has no authority to do so. This means that data transfer need to be on e.g. secure ftp-sites and postal delivery also has to ensure minimal secure delivery mechanisms.

Regulations/restrictions on data and derived information use

Apart from licence regulations – to be discussed with the data licence holder – other security regulations need to be concerned to issue a GMES multi-user licence to the GMES projects. Amongst these are the above formulated restrictions on the use of the data for certain users only.

It needs to be considered to which extend the results (i.e. derived geoinformation) from otherwise restricted data can be made public or accessible to parties, which might not be allowed to handle the original data otherwise.

Security related issues impact on G-MOSAIC project, in different aspects and at different levels; the following list summarises them and addresses the main WP dealing with them:

1. Users Interface (WP6100, WP7000, WP2100, WP3100)

Many of the G-MOSAIC target users belongs to Civilian and Military Staffs requiring a severe classification and dissemination restriction of their tasks, working practices, handled information. These requirements will be taken into account in WP6100 activities by WP7000 activities, and by WP2100/3100.

2. Services Design & Validation (WP2100&WP3100)

Sensitive information may originate from different sources:

- Information regarding procedures and standards that National or International Authorities followed for the implementation of policies;
- Technical information regarding users systems and methodologies.

Proposed approach in service design, taking into account these constraints, is:

- Integration of service products at user premises;
- Masking of some info in disseminated products (example: target areas, context, etc..) to be agreed with user.

3. Non EO Data Access (WP4400)

   Non-Earth observation data with limited access to public and non-national security organisations may be a substantial input the various user scenarios. While some of this information might be non-available to the project, other might be available with certain restrictions. Therefore, security aspects are relevant in order to:

   - satisfy security requirements of the data source in terms of knowledge, access and distribution of data
   - satisfy security requirements of security users towards the data sources in revealing their interest in certain geographic areas
   - ensure proper data and information handling (access, need-to-know, etc..) throughout the entire processing and service delivery chain in the project for such data requiring specific attention.

   The Data Access task will compile all required reference information to ensure the proper data handling in the project and allow the design of operational systems.

4. Architecture Design (WP5000)

In this part of the study, Security aspects are relevant to:

- Threats (to the system) Analysis (WP5300)
- Sensible information handling (WP5100, WP5300, WP5400)
- Dual Use and interoperability (WP5100, WP4500)
- Contract Models (WP6300)

5. Project Deliverables Handling (WP1210)

The Coordinator will set up a table for classification of deliverables, filled by WP leaders and discussed by Executive Board first meeting; Classification shall be reviewed regularly during the project (i.e. Executive Board meetings supported by the User Advisory Board).

6. EO Data (WP1220)

While interfacing G-MOSAIC, ESA-DAP will be requested to take into account that in particular situations Users could ask a restriction on the tasking and use of EO data for their services deployment.

Experience of the security knowledge of the contributors:

Within DLR a number of EO missions and the corresponding data with high security requirements are already treated operationally. The most prominent at DLR is TerraSAR-X where security concept, implementation and respective operations is elaborated and performed by DLR. This includes securing the positive control of satellite, securing ordering information, encrypted payload data downlink and secured data delivery a the more or less highest security level achieved so far for a completely civil (!) European EO mission. DLR is also participating in several studies for EO mission ground segment security aspects, especially in ESA projects.

G-MOSAIC Approach for information security management

Specific topics of the security management to be considered in each provided Service Chain are:

- **Access control** that consists of all of the various mechanisms (physical, logical, and administrative) used to ensure that only authorized persons or processes are allowed to use or access a system
- **Communications security** that involves ensuring the integrity and confidentiality of information transmitted via telecommunications media as well as ensuring the availability of the telecommunications media itself.
- **Policy, standards, and organization.** Policies are used to describe management intent, standards provide a consistent level of security in an organization, and organization architecture enables the accomplishment of security objectives.
- **Architecture and system security.** Computer architecture involves the aspects of computer organization and configuration that are employed to achieve computer security while system security involves the mechanisms that are used to maintain the security of system programs. PC and LAN security issues, problems, and countermeasures are also in this domain.
- **Physical security** that involves the provision of a safe environment for information processing activities with a focus on preventing unauthorized physical access to computing equipment.

In each service chain an analysis on the sensitive data (security level, traceability, confidentiality, quality of data, requested Military Standard …) has to be performed in order to define and implement specific security measures related to the information security management.

In a service chains the following security measures could be in some case implemented:

- Data servers (e.g. WMS, WCS and WFS services) need to use HTTPS (SSL) and basis authentication (username/password).

- Users are grouped in roles, which have data access rights defined at the level of the data base (for feature data).
- Image servers could implement IP filtering (on top of basic authentication).
- For XML structure data access (e.g. WFS for GeoRSS or KML) it should be considered XML signatures for data encryption.
- In specific context requiring secure communication (e.g. exchange between Commission in BRUX and EU delegations), it should be considered a dedicated secure communication services.
- HTTPS and basic authentication will be security measures applied to prototype services.

The responsible in charge of the definition and monitoring of the application of the security measures should be defined as Service Level Agreement with individual users by the relevant service providers. Implementation could require some form of certification and the service provider will be in charge of monitoring the security measures, probably with regular reviews, and supported by "certification authority".

In some cases different security measures needs to be implemented in different components of the service chains such as Data exchange and Access to data sets beyond a particular processing stage (i.e. more relaxed for raw data, more restricted for service output).

Information security management standard

ISO IEC 27001 is an information security management standard. It defines a set of information security management requirements. The purpose of ISO IEC 27001 is to help organizations establish and maintain an information security management system (ISMS).

How the organization meets each of the ISO 27001 requirements, and to what extent, depends on many factors, including the organizations:

- Size and structure
- Needs and objectives
- Security requirements
- Business processes

ISO 27001 is made up of two kinds of information security requirements:

- Methodological requirements
- Security control requirements

Each service chain (where needed) could follow a gap analysis approach in order to compare the existing ISMS with the ISO IEC 27001 requirements. Such a comparison would pinpoint the areas that fall short of the standard (the gaps) and it would focus on information security gaps.

B.2.1.5 "Data Security Issues" for the Data Access Portfolio (DAP)

As G-MOSAIC is funded from the general FP7 GMES budget, general regulations on the use of the grant apply. It needs to be verified whether this – per se – excludes the handling of "classified" information. Demonstration cases can be defined within G-MOSAIC, which verify the ability of the used data to demonstrate its capabilities for the intended applications, without necessarily selecting sensitive "geopolitical" areas. Experiences from EU-projects such as GMOSS have shown that even areas in Iran, Iraq etc. could be treated (in this case with US VHR optical data) without problems.

It is therefore assumed that the considerations and restrictions described below may apply to G-MOSAIC only in rare and selected cases.

However, G-MOSAIC shall demonstrate the technical capability of the European Commission to react the civil security cases on the global scale. Therefore, the architecture of the GMES G-MOSAIC data management and delivery systems, shall take security into consideration from the very beginning.

The following issues in the DAP related process can be sensitive with respect to data security:

User management and user licences

Certain missions/ certain sensor modes require a strict knowledge of the user/licensee of the data. The user cannot be only a consortium but shall be a legal entity based in a known country. It needs to be clarified, whether one legal entity can sign a licence agreement on behalf of the members of a consortium or interest group (independent of their country of origin) or whether each data user in the consortium needs to be identified.

The user identification and licence agreement is not only required for the legal process but might also determine which use will be allowed to receive the data. As within the German national satellite data security law (SatDaSig) – as applicable for TerraSAR-X high resolution modes – some users might get data without any additional permission, whereas other users might require a further governmental check. This further check delays the delivery of the data. The data delivery might also be denied. Under the current assumptions of the SatDaSig national military and security agencies of NATO members and other states have access to data otherwise restricted to other users. It is worth a check, whether some of the end-users in G-MOSAIC fall under this category. Also it needs to be concerned that the data (i.e. the TerraSAR-X images) are not directly delivered to the end users (which might be national security agencies) but to value added companies within the G-MOSAIC consortium (which will not fall under this category)

Ordering and Tasking Satellite data

Certain missions/ certain sensors might impose restrictions for the ordering of data. Under the SatDaSig these restrictions are described in a so called "Geo-Matrix". The "Geo-Matrix" checks:

Which user is ordering the data, has he special permissions or restrictions? (See above)

Is the sensor critical (e.g. SAR or hyper spectral and very high resolution)?

Is the ground station, receiving the data critical?

Is the area to be images critical?

Current assumptions are that the majority of all requests are uncritical in this matrix. If one of the above issues is critical, certain restrictions may apply, ranging from delay in delivery up to denial of delivery.

For G-MOSAIC this means that some sensitive requests (e.g. border control in Iran, trafficking in Afghanistan, etc.) might be sensitive and the execution cannot be performed under near real time conditions or even denied using certain satellite data.

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Regulations/restrictions on data and derived information use

Apart from licence regulations – to be discussed with the data licence holder – other security regulations need to be concerned to issue a GMES multi-user licence to the GMES projects. Amongst these are the above formulated restrictions on the use of the data for certain users only.

It needs to be considered to which extend the results (i.e. derived geoinformation) from otherwise restricted data can be made public or accessible to parties, which might not be allowed to handle the original data otherwise.

B.2.1.6 Liaison with GMES Initiative

An important aspect of the Implementation Strategy of G-MOSAIC, is the coordination between the project activities, results, achievements and GMES Security external (to the project) "world"; i.e. the end-user community, and the GMES actors involved in understanding the governance aspects concerning security.

This is why, at Coordination level (WP1210), a specific task is dedicated to stimulate and maintain a constructive dialogue between the project and the on-going GMES activities, keep the G-MOSAIC activities linked within overall European security policy and with the GMES initiative at EC level (it will be a bi-directional flow, where G-MOSAIC will be asked to provide comments\inputs to GMES related papers, to user implementation group reports, etc., and on the other hand it will be asked to drive its activities on the roadmap given by the EC concerning GMES governance, etc.). This information flow between the project and the GMES Bureau shall be managed and carried on by the Coordinator, with the support of the Executive Board, and the inputs coming from the WPs deliverables.

B.2.2 Beneficiaries

The forms including the description of each Participant to G-MOSAIC Consortium is reported in a dedicated Section of the document**, B.7** ***Participants to G-MOSAIC Consortium***

B.2.3 Consortium as a whole

In order to be achieved, G-MOSAIC objectives require a heterogeneous team working together, and bringing in the project excellent skills concerning the following expertises:

- Satellite based Information Services
- Socio-economic, political Themes
- Information Services Infrastructures
- Innovative EO products Research
- Security Systems
- Economic models
- Architecture Models

In fact, G-MOSAIC requires to exploit the experiences gained in GMOSS NoE, concerning products and methodologies, in a service oriented framework; LIMES is doing the same for complementary security services (homeland and border control, support to outside EU intervention on humanitarian relief), while G-MOSAIC complex service scenarios require heterogeneous data sources (news data mining, socio-economic parameters, etc.).

Moreover, the study on suitable and sustainable security services architecture based on the construction of funding models requires specific skills that, in continuity and complementarily with LIMES activities, bring a value addition to the on-going GMES governance discussions and to the global activities that are defining information systems for security, at European level.

In this context, G-MOSAIC Consortium is involved in project activities according to the following schema:

WP1000: Project Management

Telespazio leads the Project Management activities. These have been grouped into the two main branches of Consortium and Technical Management. The Consortium management activities (WP1100) are carried out directly by TPZ with the support of the General Assembly. As for the Technical management activities TPZ is directly supported by DLR, JRC, Infoterra UK, Thales Comm., INDRA ESPACIO,. Here WP Leaders are also involved in order to share the technical and operational management activities, to orient the project according to a consensus at Executive Board level.

TPZ that is already leading LIMES and MARISS, will guarantee effective project coordination, keeping it aligned with GMES initiative progress.

WP2000: Support to intelligence and early warning & WP3000: Support to Crisis Management Operations

Thematic WPs (WP2200, 2300, 2400, 2500, 2600, WP3200, 3300, 3400): The leadership has been given to Companies that have proved experience in the specific Themes and that can drive the improvement and technological innovation in the specific service chains, and basic products in continuity with previous and on-going activities; the technological excellences of G-MOSAIC team, in service chains implementation and operations, EO based innovate product development, at Industry, SMEs, Research level are grouped in the thematic WPs.

WP2100 and WP3100: The leadership has been assigned to **ITKU** for the WP2000, where a cross-cutting approach with respect to other GMES product and services is a key element, and to **TPZ** for WP3000, where security related aspects, and integrated service deployment approach for crisis operation support is a key characteristic. Thematic WP leaders contribute to the complex service cases definition, and management, thus guaranteeing the requested synergy among different service chains and data sources.

Moreover, fundamental contribution for the WP2100 and WP3100 objectives is given by "Think Tank" Partners (Adelphi Research, IAI, FRS, King's College); they will support the technological oriented partners, in understanding and defining operational user scenarios, in giving indications on "non geo-spatial" types of data and data sources for complex service cases (socio-economic, political info, etc.), in facilitating the establishment of a common language between Users and service providers. This role has been specifically asked by the interviewed Users during the proposal preparation.

WP4000: Cross-cutting Aspects in GMES Security Services

Relevant GMES actors, mainly in Security applications, coordinated by **INDRA ESPACIO**, guarantee the achievement of WP4000 objectives. These are related to the contribution to the on-going GMES governance definition, to the study of strategies and scenarios for effective data access (DLR, EUSC, Telespazio), to the contribution to the definition of a suitable service portfolio for Security applications (TPZ, together with major service providers), within the general context of GMES stakeholders and assets (INDRA ESPACIO, with Infoterra Global, Thales Communications, etc.).

Moreover the liaison of G-MOSAIC services with INSPIRE standards in given by JRC, IMAA that are actively working on this n other GMES initiatives. Policies Analysis, that is the basis for GMES applications, is carried on by IAI, King's College, EUSC that have relevant skill and experiences (LIMES, GMOSS, Astro+, etc.) and institutional roles.

WP5000: Modelling GMES Security Sustainability

This WP aims at defining, implementing and evaluating the architectural solutions for sustainable provision of G-MOSAIC security services. Long-term and short-term perspectives are considered.

THALES Communications (TCF) leads the activities of this WP, bringing its expertise in the definition and development of systems for security missions, and providing specifically to the project its architectural and methodological skills for the definition of the GMES security architecture target and its associated long-term roadmap and recommendations to reach this objective. In a short-term, perspective, TCF will also contribute to the common G-MOSAIC platform.

The activities of the WP are realised between the following skilled actors of the project:

The architectural solution will be based on CONOPS (WP5100), QoS (WP6300), and interoperability analysis (WP4500), conducted respectively by TAS-I, INDRA ESPACIO, and TAS-F, with the participation of Planetek and TCF.

The solution will take into account economic and funding models (WP5200) defined by LUISS (in continuity of the BOSS4 GMES initiative), , bringing specific expertise on Security.

Modelling and evaluation of the service architecture (WP5300) will be realised, driven by TCF, with the participation of SYNESIS, a consulting company specialised in architecture and interoperability issues.

The G-MOSAIC common portal (WP5400) will take into account the results of the previous activities and of the users needs (service case scenarios), this will be led by Telespazio (as for other GMES initiatives and based on its experiences and assets) with TCF, TAS-F, TAS-I, Infoterra-UK and Platenek.

Finally, the evaluation of the architecture (WP5700) will be performed, carried on by TCF with the participation of Telespazio and Synesis.

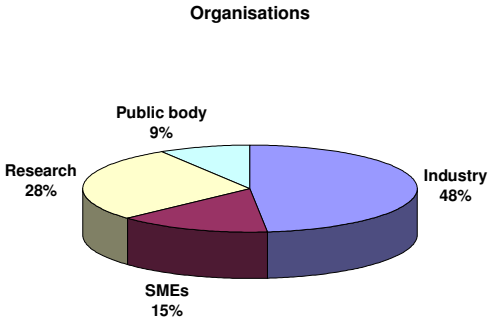
WP6000: User Engagement, Coordination and Training

EUSC leads the activities of this WP (and of its sub-WPs), being a key institutional operational actor, in inter-pillar geo-spatial products provision; the specific WP activities will be carried on with the contribution of other key actors in interfacing Security related users (SRC, JRC).

This synthetic overview on G-MOSAIC activities should highlight the soundness of the Consortium; moreover it should also show that one of the challenge of G-MOSAIC is an innovative approach to the definition of information services supporting security, based on the assumption that the most efficient, effective and useful information services supporting Security related problems, are those ones that fuse together different data sources, and heterogeneity of signals, pictures, news, relevant to a specific critical scenario, are manage and turn them into complex information for fast and effective decisions to be made by relevant Users.

WP7000: Dissemination

Arsenale Novissimo will be leading the work package and will be involved in all subtasks.
The specific WP activities will be carried on with the contribution of TPZ to organize and subcontract the associated logistics costs and to organize the User participation to dissemination events.



In conclusion, with respect to the balance among Industrial, SMEs, research organizations contributions to G-MOSAIC project, the grouped Consortium will take advantage of:

1. Big industrial groups and European operational institutional entities, that ensure that Security related Users trust in the proposed services reliability, capacity to handle security issues, etc. (48% of EC contribution),
2. Research actors that guarantee the innovation and the high technological level of the developed products and service chains (28% of EC contribution),
3. Operational public bodies that are involved in security related activities at European level (9% of EC contribution),
4. SMEs bringing their contributions, in non EO information handling, in specific building block of the service chains, or of the architectural design (15% of EC contribution).

B.2.3.1 Sub-contracting

The following list reports the main sub-contracting types that will be necessary to G-MOSAIC activities:

- The costs of audit fees associated with the preparation of audit certificates will be subcontracted to external auditors. These costs have been charged for all the partners on Consortium Management activities (i.e. WP1100) for a total amount of about 22,5Keuro (TPZ, TCF, DLR, INDRA ESPACIO, GMV, Infoterra UK).

- Specific budget (about 60Keuro) has been considered for allowing the participation of external experts and representative of Users, to specific project meetings (advisory board) and events such as pilot services pre-operational deployment, training sessions, meetings and workshops. The budget will be managed by the project coordinator under the WP7000, Dissemination activities.

- The dissemination costs relevant to production of material and tools (graphic design, printing, Web Site, translations and simultaneous translation services, etc) as well as the workshops material costs (event organization, including logistics, etc.) will be sub-contracted, by the project coordinator involved of WP7000, using part of the budget allocated to that WP (about 60KE).

- It could happen that specific (now un-planned) non-EO data and un-planned external services are requested by pilot service cases deployment, and that they have to be sub-contracted, in order to be procured; a budget reserve for all the project is allocated in WP1210 Technical Coordination (about 35 KE).

B.2.3.2 Additional partners

G-MOSAIC Consortium includes all the requested skills to perform the proposed activities; however, due to the quickly evolving scenario in terms of requested information to support intelligence and crisis management operations, in terms of actors involved in these fields of application, in terms of user needs, G-MOSAIC project is open to evaluate the entrance of additional partners for specific activities, currently not foreseen.

B.2.3.3 Other countries

Currently not applicable.

B.2.4 Resources to be committed

Resources to be committed for the achievement of G-MOSAIC objectives include:

- Staff effort (person/months and travels),
- Data:
  - Space Based Observation Data,
  - non-EO Data
- Processing Infrastructures, Assets, Tools

Staff effort is all charged on the eligible costs (both as personnel costs, and as sub-contracting when strictly necessary).

The Activities requiring data and processing infrastructures resources are: WP2000, WP3000 (Thematic WPs) and WP5000 (Common Portal, architecture modelling and evaluation).

In the following table are summarized for each Work package the resources which are needed to carry out the project (personnel, indirect costs, travels….)

Resources	1000	2000	3000	4000	5000	6000	7000	Tota
Travels & Subsistance cost	109.221 €	339.868 €	189.129 €	61.291 €	74.219 €	61.461 €	15.000 €	850.1
Other Direct Cost (with the exclusion of T&S)	6.000 €	82.018 €	94.801 €	9.420 €	12.000 €	36.614 €	- €	240.8
Indirect Cost	675.125 €	1.949.724 €	1.093.801 €	508.095 €	937.813 €	244.090 €	32.096 €	5.440.7
Personnel Cost	947.934 €	3.214.256 €	1.925.549 €	868.351€	1.124.202 €	404.465 €	103.327 €	8.588.0
Person Month	152	607	303	131	150	69	9	1

Table B-17: Estimated G-MOSAIC Resources

Major costs breakdown

In the following a short explanation is given for the major costs categories vs major partners.

Other Costs Types (Dissemination and Training activities)

- (1)TPZ other costs refers to WP7000 Dissemination personnel and Sub-contracting
- (7)EUSC and (8)JRC other costs refers to WP6200 Training
- (15)AN other costs refers to WP7000 Dissemination

R&D costs - other direct costs

- (1)TPZ, 138,5KE for travel & subsistence; 40KE in WP3100 for non-EO data supply; 35KE subcontracting, as reserve budget for un-planned external services/non-EO data supply (in WP1210 Tech Coordination); 12KE for equipment (WP5400)
- (4)DLR, 66KE travel & subsistence
- (7)EUSC, 97kE travel & subsistence; 57KE non-EO data; 8KE consumables; 27KE support material for WP6000 User eng. & Training
- (8)JRC, 41,6KE travel & subsistence; 3KE consumables; 3,6KE support material for WP6000 User Training; 8KE non-EO data
- (9)SRC, 34,8kE travel & subsistence; 21,6KE non-EO data; 6KE support material for WP6000 User eng.
- (12)SCOR, 27KE travel & subsistence; 4,5KE non-EO data;
- (17)Infoterra UK , 56KE travel & subsistence
- (18)ITD, 34KE travel & subsistence
- (37)Adelphi, 16,7KE travel & subsistence; 26,5KE non-EO data;

Staff effort

Personnel effort is the resource that is mostly mobilised for G-MOSAIC activities, and is almost all charged on the eligible costs. The professional profiles required, are mobilised by the Organizations that participate to the Consortium.

Space Based Observation Data

G-MOSAIC will benefit of the Data Access Program, managed by ESA, i.e. the relevant costs are not included within the eligible costs of the project. The following table gives a first assessment of G-MOSAIC requested data; during the project execution, the G-MOSAIC Service Providers will tune their data needs and a continuous information exchange will be carried on between project Coordinator (supported by WP1220 partners) and ESA, in order to guarantee to G-MOSAIC services the needed EO data, duly pre-processed and timely delivered.

Service chain	*Covered area (each) (Km^2)*	*# of areas*	*# of acquisitions per Type of sensor*	*Resolution (m)*	*Access type*	*Geographic area*	*Approximate # frames*
Proliferation and treaties	20 to 70	3	Optical: 20 SAR: 40	1 (to 3)	Pre-defined	Africa, Broader Middle East	60
Crisis indicators	100	1	SAR: 3	1 to 3	Pre-defined	Africa	5
	50-100 K	3	Optical: 3 SAR: 3	30			30
	250K	3	Optical: 72	100-300			70
Critical assets	100	4	Optical: 40 SAR: 40	1 (to 3)	Pre-defined	Africa, Broader Middle East	80
	TBS	4	SAR: 130	10 to 30			130
	1M	1	Daily or even more	500 to 3K			n.a.
Illegal activities	50 to 200	6	Optical: 35 SAR: 40	1 to 3	Pre-defined	Africa	75
	3.6K to 10K	3	Optical: 9 SAR: 12	10			20
Routes and borders	50K	1	Optical: 28 SAR: 17	2.5 to 10	Pre-defined	Africa, Eastern Europe	45
	100	2	Optical: 8 SAR: 10	1 (to 3)			20
Planning for emergency	100	15	Optical: 20 SAR: 30	1 to 3	Pre-defined	Africa, Broader Middle East	50
	1000 to 10K	5	Optical: 10	10			10
Crisis management operations	100	5	Optical: 20 SAR: 10	1 to 3	On demand, Rush tasking	Africa, Broader Middle East	30
	100	5	Optical: 15 SAR: 10	10 to 30			15
	100	5	Optical: 10 SAR: 4	300			15
Crisis consequences management	1K	2	Optical: 12 SAR: 10	1 to 3	Pre-defined with some on-demand	Africa, Broader Middle East	22
	1K	2	Optical: 2	10			2

Table B-18: Preliminary assessment on G-MOSAIC EO Data Needs

Table 2-1 has to be considered as a **preliminary assessment**, since service cases will be defined in the first phase of the project according to user operational scenarios and needs. The last column reports the number of frames, calculated with the additional assumption of mean area coverage for each typology of data.

Non EO Data

The G-MOSAIC strength is the integration of EO-data with additional information. G-MOSAIC services will integrate heterogeneous data sources, for generating and delivering complex products and information. Generally speaking non-EO data will be included in the service chains, such as: vector GIS layers, topographic maps, socio-economical data, historical and statistics data, population information, news, events records, airborne and ground sensors acquisitions, etc.

These non EO heterogeneous data will be provided in different ways: user engaged, open sources, UN organisations such as Humanitarian Information Centres (HIC), G-MOSAIC partners, purchased on commercial bases.

In some cases G-MOSAIC will geo-reference unstructured data (example news, open sources data) thanks to proprietary tools provided for the service cases pre-operational demonstrations by G-MOSAIC partners (Ex. SPRINT from Thales Communications).

Service Chain	**Service Chain Responsible**	**Theme /data (e.g. census data, export statistics)**	**Non EO data Source**	**Non EO data Dimension**	**Level of Detail (e.g. district, country, global)**	**Update frequency (e.g. monthly, annual, irregular)**	**Availability (e.g. open source, commercial)**	**Data Provider (e.g. engaged user, partner)**	**User or Partner involved (if any)**	**Geographic area**
WP2200: Proliferation and treaties	INDRA ESPACIO	NA	NA	NA	NA	NA	NA	NA	NA	NA
WP2300: Crisis indicators: ENR Index	JRC	• Statistics on primary production (mining, agriculture, forestry) • Export statistics	World bank (World Development Indicators), FAST Local Information Network, Fieldwork	Tabular statistics (partly hardcopy), Reports, Interviews,	Country Level (WDI), Regional (FAST)	WDI: Annual FAST: monthly Other field data: irregular	Commercial, Open source, Field data	engaged user and/or partner	Adelphi, Swisspeace, JRC, Global Witness	DRC
WP2300: Crisis Indicators: PP Index	JRC	Latest population statistics	Local and national authorities , NGOs	Tabular statistics	Country level (or better, if available)	irregular	Open source	partner	JRC	Senegal
WP2400: Critical Assets	GMV	• - Planimetric vector data (human assets, infrastructures, etc) • - Land Cover/Use vector data • - Aerial photographs	National authorities, NGOs, Field workers, UN statistical data Reports, statistics	Reports, Interviews, Statistics	Country level (or better, if available)	irregular	Commercial, Open source	engaged user	SITCEN, EUMS	Africa, Broader Middle East
WP2500: Illegal activities	DLR	• Export statistics, Vector data (street network, …), • Concession data	Involved users, NGOs, GTZ, Local information Local authorities	Tabular statistics, Reports	Country level (or better, if available)	Annual	Commercial, Open source	open	Global witness, BKA	Africa
WP2600:	Infoterra	Reports and, if	Authorities, military,		hot spots	as often as	Commercial,	open		Africa,

Service Chain	Service Chain Responsible	Theme /data (e.g. census data, export statistics)	Non EO data Source	Non EO data Dimension	Level of Detail (e.g. district, country, global)	Update frequency (e.g. monthly, annual, irregular)	Availability (e.g. open source, commercial)	Data Provider (e.g. engaged user, partner)	User or Partner involved (if any)	Geographic area
Routes & Borders	GmbH	available, statistics on border crossing activities, migration routes and settlements/refugees	NGOs, national/international refugee organisations			possible	Open source			Eastern Europe
WP3200: Planning for crisis	TPZ	• Latest population statistics, GNP and similar statistics • Geo-information	National authorities, NGOs, Field workers, UN statistical data	Tabular Statistics, Reports GIS data	Country, District level	irregular	Open source Local authorities	Commercial, users (member states or EU)	JRC, SITCEN, DG RELEX MS	Africa, Broader Middle East
WP3300: Geo-spatial support for Crisis Management Operations	EUSC	Thematic maps in particular ethnical, food insecurity, etc	Topographic maps, city plans, intelligence on ground (photos, GPS Points, etc)	Tabular Statistics, Reports GIS	District level	irregular	Commercial, Open source, Field data	Commercial, users (member states or EU)	SITCEN, EUMS, EU OPERATION, MEMBER STATES	Africa, Broader Middle East
WP3400: Consequence management, reconstruction and resilience	DLR	• Latest population statistics, GNP and similar statistics • Vector GIS layer (e.g. streets, administrative borders)	National authorities, NGOs, Field workers, UN statistical data	Tabular Statistics, Reports	District level (better city level)	irregular	Open source Local authorities	open	JRC, DG RELEX	Africa, Broader Middle East

Table B-19: Preliminary assessment on G-MOSAIC Non-EO Data Needs

Infrastructures, Assets, Simulators, etc.

Satellite Service Providers involved in G-MOSAIC own processing and archiving facilities (hardware and processing environment) and will contribute with these facilities to the G-MOSAIC project, using the funds of the project to improve, to tailor, and to integrate these assets into the service chains developed according to the G-MOSAIC innovative methodology.

For the Architecture modelling activities, Thales Communications property development environment will be exploited. Architecture views developed in the framework of G-MOSAIC shall be proposed to standardisation organisation, with the authorisation of the EC. Modelling tools (COTS) used in the projects remains the property of the organisations specified in the corresponding license agreement info.

G-MOSAIC Pilot Services are based on utilization of operational infrastructures and service supply chains, that will exploit as much as possible already developed assets (other GMES applications, proprietary infrastructure, etc.); nevertheless these chains, tools, processing infrastructures shall be updated for G-MOSAIC specific needs: sometimes this updates could require the acquisition of equipment, software by the service providers.

In order to implement the G-MOSAIC service chains, and service case, and the portal integration, a budget shall be allocated by Partners, for equipment and software, necessary to the above described integration. This budget is allocated on the specific thematic WPs, and on WP5400.

The following Figure further illustrates for the G-MOSAIC pilot services, how the committed resources are well distinguished and coherently complement the resources co-funded by EC.

Concerning analysis and study activities, they are basically carried on by G-MOSAIC partner's qualified human resources whose costs are charged on the EC eligible costs; analysis and study activities will take advantage, when needed, of proprietary tools and development environments provided by some of the partners as committed resources complementing the EC contribution.

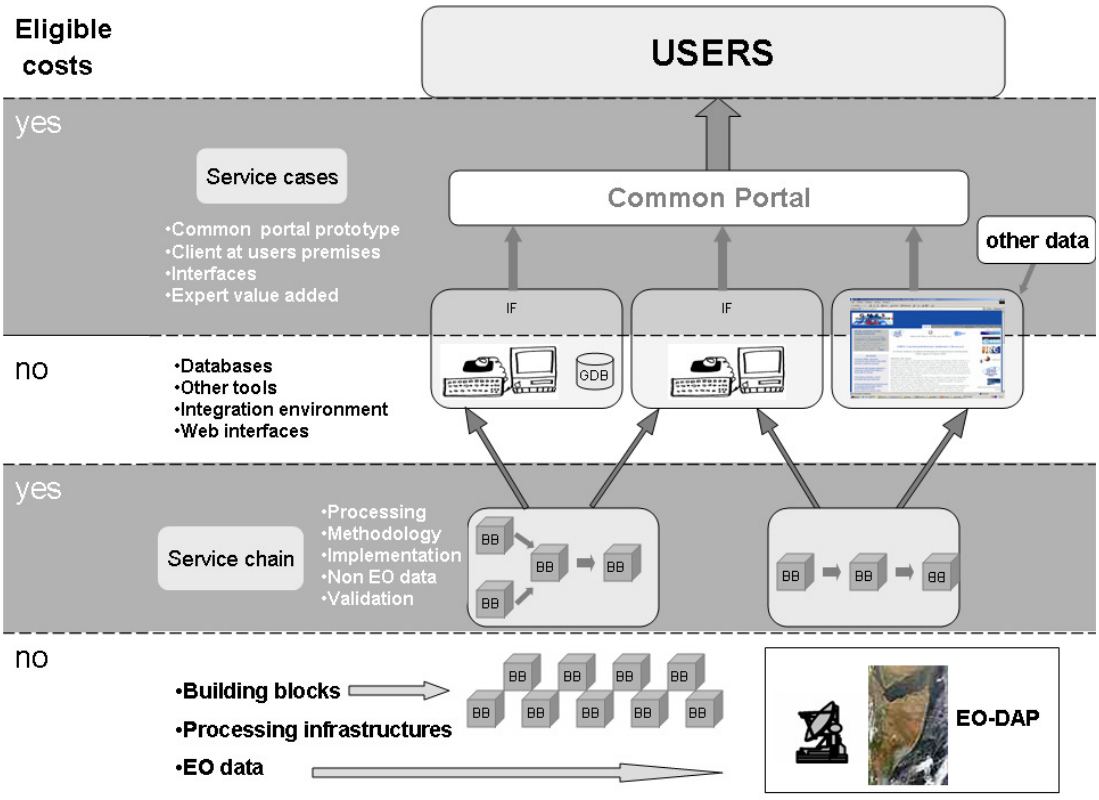


Fig. B-11: Resources Committed for G-MOSAIC pilot services

B.3 Impact

B.3.1 Strategic Impact

[R1]: Validated service scenarios meeting specific GMES user needs will be established. Further insights into the uptake of products, possible business models for operational supply, and the evolution and trends of future sensor needs will be obtained. The results obtained will contribute directly to the sustainability and competitiveness of European value-adding services. These services will help providing Europe with the capacity which allows it independently to evaluate its policy responses in a reliable and timely manner. Data harmonisation and standardisation improvements will contribute to the establishment of a European Spatial Data Infrastructure.

B.3.1.1 Contribution of G-MOSAIC towards expected impacts

B.3.1.1.1 Validation of service scenarios meeting GMES security user needs & uptake of *products*

The approach to G-MOSAIC pilot services deployment has been driven by the objective of validating service scenarios aimed at providing information relevant to external regional crises, in all the phases of the crisis; G-MOSAIC Information Service Cases address:

At global level:

1) Support for Crisis Prevention and Forecasting (intelligence and early warning), through the development of service chains for the monitoring, identification, analysis of specific **Threat Warning Factors (or Triggers**), such as Critical Assets monitoring, Proliferation activities, Environmental Crisis Indicators, Surveillance of borders and routes.

On situations\areas prone to crises:

2) Support for Crisis preparedness and planning
3) Support for Crisis Management Operations
4) Support for post-crisis damage assessment and reconstruction

In the targeted security applications, G-MOSAIC challenge is to handle the development and the geo-spatial intelligence pilot services with such a comprehensive and pre-operational approach, as it has never been experimented so far.

As G-MOSAIC will be based on the maximum re-use of other GMES developments, specific project activities have been included in order to obtain the most effective integration in Users practices and methodologies, trying to contribute to methodologies improvement, thanks to innovative service chains.

In facts, validation activities will be performed on Service Cases designed starting from User operational scenarios; user quality acceptance of pilot services will be collected on the basis of a clear and measurable relation established between deployed services and user needs identified starting from their real work-flow.

With respect to GMES on going activities, G-MOSAIC will interact in two directions:

1) From G-MOSAIC to other GMES initiatives: Innovative service cases, designed by the integration of service chains, methodologies and heterogeneous data will contribute to the definition of GMES service portfolio for security related applications, and may also benefit other application areas (for example AMESD initiative for Africa, Emergency, etc.); this liaison will bring benefits to the GMES Initiative, widening the horizon of exploitation of its services, to a larger User Community, and augmenting the service portfolio supply.

2) From other GMES initiatives to G-MOSAIC: a cross-cutting approach will drive the definition of G-MOSAIC Service chains, that will be set up starting from the uptake of the already developed and validated GMES products and service chains for other applications. These building blocks will be assembled in security dedicated service chains designed to implement innovative methodologies and will be an excellent starting point for G-MOSAIC portfolio.

The specific contribution of G-MOSAIC products will lay in the exploitation of innovative EO data sources (in particular the VHR SAR satellites), and in the improvement of automation processes for feature extraction and change detection.

B.3.1.1.2 Contribution to the sustainability of European VA Services Supply

A significant effort will be spent during G-MOSAIC project to deploy the service cases, and in general to put the technological and operational results, within the context of a sustainable provision model, with respect to both a short-mid term perspective and a long term perspective.

- In the short-term, the project will demonstrate the delivery of G-MOSAIC security services, well integrated in user operational scenarios, throughout a portal for the common use and/or exchanges of data, products and core services;
- In the long-term and in the GMES global security perspectives, the project will establish a realistic roadmap towards the GMES security sustainability target, taking into account pre-operational and operational capabilities and assets, interoperability and dual-use issues, and economic, organisational and operational aspects.

The specific framework that is taken as a reference for G-MOSAIC services is the GMES governance and general service architecture that will be under definition during the G-MOSAIC lifecycle. Indeed, G-MOSAIC, together with the other GMES projects will provide inputs to this on-going complex process, specifically addressing Security applications.

The architectures of services provision will be investigated in terms of maximizing value for the whole array of stakeholders: from providers to end users, including investing institutions.

One of the most significant factors that hinder the adoption of new technologies is the time spent to endorse them, as well as the economical and cultural impact within organizational and working methodologies of users. There is an internal cost for adopting new products and services together with a highly perceived risk (by the user's top management) for the possible failure of the new technologies, especially when the service continuity is not guaranteed.

This is why, one of the ambitions of G-MOSAIC pilot services is a contribution to the operational processes of the users; indeed, G-MOSAIC service cases are designed to be embedded within the workflow of users: this is a valuable guarantee for the sustainability potential of the developed services.

If the project will succeed in accomplishing the above mentioned objectives, it means that the related industrial partners will have developed a competitive position in this innovative domain of technological services. This is especially true for the purpose of security, which is progressively becoming more and more important for governments and citizens. So, thanks to GMES security initiatives, EU industrial context is becoming sufficiently advanced to offer, by means of its developed services, competitive advantages and benefits both on the internal market and in even more developed ones (USA, Japan).

Furthermore, the competitiveness attained by EU industries, in providing innovative security services, will have a primary foundation on the availability of VHR SAR satellite (COSMO-Skymed & TerraSAR-X) thanks to their NRT monitoring capabilities. Therefore, the combination of VHR SAR data and the competitiveness of G-MOSAIC pilot services will provide a significant step forward towards the acquisition of big market share worldwide.

Moreover, G-MOSAIC services aimed at supporting Institutions in the protection of EU Citizens abroad and in the prevention of external regional crises (that on the long term may negatively affect Europe), will be perceived by the public opinion as useful assets towards a secure and peaceful life style, thus contributing to build a diffuse consensus on GMES security initiative.

Thanks to an effective dissemination strategy, implemented by G-MOSAIC, such a consensus will be captured at EU and National political level and endorsed in EU and National Policies, by making available

a specific budget for policy response evaluation and evolution, thus supporting the sustainability of GMES Security Services.

B.3.1.1.3 Contribution to EU capacity to policy response evaluation

The set up of mid and long term monitoring capabilities, such as the G-MOSAIC services are, will provide support to European Institutions to evaluate the impact of the measures deployed for Regional Crisis prevention and reconstruction.

This is in line with the concepts and the objectives of the Instrument for Stability, and with the EU Security Strategy to strengthen Europe role on the international scene, as a major global peace-keeping actor.

G-MOSAIC objectives are coherent with the aim of the Community to "[..] develop a comprehensive prevention approach to State fragility, conflict, natural disasters and other types of crises[…]" [R11] and "[…]to promote close coordination between its own activities and those of the Member States, both at decision-making level and on the ground. To that end, the Member States and the Commission shall operate a system for exchange of information […]" [R11].

To this aim G-MOSAIC Capabilities will be designed, taking as a major reference cornerstone, the European Security Strategy, and the identified Threats. The expected impacts of G-MOSAIC services outputs in supporting EU to face main identified Threats is reported in the following Table.

Main threats identified by the European Security Strategy	**G-MOSAIC Services Domains**							
	Support to intelligence and early warning					**Support to crisis management operations**		
	Non-proliferation and treaties	Crisis indicators	Critical assets	Illegal activities	Routes and borders	Planning for crisis	Geo-spatial support for Crisis Management Operations	Consequence management, reconstruction and resilience
Terrorist threats	X	X	XX	XX		XX	XX	XX
Proliferation of weapons of mass destruction	XX			XX		X		
Regional conflicts		XX	XX	X	XX	XX	XX	XX
State failure		XX	XX			X	XX	XX
International organized crime	X		X	XX	XX			
							XX Direct contribution X Indirect contribution	

Fig. B-12: G-MOSAIC Services Domains versus ESS Identified Threats

As shown in the table above, G-MOSAIC will support the EU actors both in the preliminary phases of intelligence activities and early warning (for example identifying the crisis indicators of a given unstable system) throughout the implementation of the management operations when the crisis occurs (using geo-spatial support for spotting terrorist threats, or for critical events management), till reconstruction.

B.3.1.1.4 Exploitation of innovative space systems and contribution to the definition of future sensors

Concerning the evolution of space EO sensors, there are two types of impact of G-MOSAIC activities:

1) G-MOSAIC pilot services will have the opportunity to exploit products derived by innovative sensors and missions, especially SAR (COSMO-Skymed, TerraSAR-X). These missions are definitely suitable for security related services, and their benefits will be experimented and pre-operationally validated during the pilot service cases deployment, in the framework of real user operational scenarios.

   The innovative pre-operational exploitation of these new data will contribute to rise the demand and the usage of these data will contribute to generate new applications, not only for security, but also for other activities requiring high quality and highly performing data sources.

2) Through the establishment and operation of the pilot service cases the possibilities and constraints of the current earth observation capabilities to support security relevant issues will be visible. This pre-operational deployment will allow to highlight where the gaps are, in terms of performance and will provide a quantitative and validated set of requirements for new sensors and missions.

From this input, requirements for future sensors, satellites and their constellations will be derived and recommendations will be developed to define new systems for the desired purposes. This has to be done from a European perspective, since the access to the newest and future national missions within Europe and internationally has to be taken into account for a proposal regarding new sensors from ESA, which should complement at primarily the national European systems

Given the current phase in the development of EU space assets by national (TerraSAR-X, COSMO) follow on with defence related space assets and ESA programs (Sentinels), it is the right time frame to identify and clearly state the requirements related to security needs. The way leading to a sustainable approach has to take into account the minimizing of the cost of space and ground infrastructures.

In particular, new mission concepts will have to be considered and evaluated in relation to parameters like:

- resolution;
- revisit;
- detection of specific targets or movements;
- sophisticated change detection and monitoring.

The development of future sensors will play a crucial role in establishing and further developing the services, which are already partly performed and demonstrated within the pilot services of G-MOSAIC. Within WP4400 detailed recommendations for the definition of future sensors will be given, taken into account the national, European and international development at this time.

The development and exploitation of new services in the domain of civil security demands latest sensor and satellite technologies in terms of geometric resolution, spectral capabilities (in the optical, thermal and microwave domain) as well as agility of the satellite, re-visit capabilities and fast access to the data.

In short, G-MOSAIC will challenge the existing earth observation sensor and satellite capabilities. While using latest earth observation sensor capabilities (though limited for declassified satellites for the G-MOSAIC project), the services developed in the project will also identify requirements to enhance existing sensor capabilities.

Recommendations for new sensors, sensor technologies and operation modes could be stated in the following domains:

- optical geometric resolution and oblique viewing conditions
- optical spectral capabilities
- Exploitation of SAR polarimetric modes
- SAR new microwave bands
- Constellation of many satellites
- New satellites orbits for observation
- Satellites tasking and ground segment enhancement

B.3.1.1.5 Contribution to a European Spatial Data Infrastructure

G-MOSAIC will deliver services to users that have stringent requirements in terms of confidentiality and availability of the information.

From this basic assumption, the project will define/demonstrate the feasibility of an architectural perspective for the integration of GMES services/systems which can fulfil several (and sometime contrasting) needs from different user typologies, (Defence, civilian institutional, commercial) but all coexistent in the same service framework.

So, the specific and peculiar contribution of G-MOSAIC to the construction of a European Spatial Data Infrastructure, stays in a comprehensive analysis of standards and interoperability concepts, that will take into account both the INSPIRE principles and the restrictions on data handling due to Classification of information and security oriented services.

As an example, a Drought Risk Map or a Land Use Map produced for environmental analysis will have different requirements in terms of metadata, quality level, reliability, confidentiality etc. than the same Map produced for extracting complex crisis indicators to be used for situation awareness of potential instabilities or failure of external States. Dual Use concepts (in continuity with LIMES) will enter in this analysis, with the aim of contributing to the Spatial Data Infrastructure suitable both for environmental applications and for security related ones.

Specific attention will be also paid to information security to face any threats to systems themselves and ensure system protection in terms of Availability (resources and data available at any time they are required), Integrity (resources and data can be modified or deleted only by the owner) and Confidentiality.

G-MOSAIC services addressing security scenarios are inherently distributed, both amongst G-MOSAIC partners and entities that may hold important ancillary data or who are active in collection and assembling of supporting information. This distribution applies to data sets and relevant algorithms that may be addressable via dedicated service interfaces. Furthermore, security products may be addressed to a number of end-users, each with their own technical capacities to process the products in their decision making environments.

The INSPIRE directive provides a broad harmonization framework in order to ensure operational coherence between the various building blocks aimed at establishing a European wide infrastructure for spatial information in support of the Community **environmental** policies. G-MOSAIC is expected to give a major impulse to expand the scope of INSPIRE directive guidelines to the **security** related policies. Given the scope of the G-MOSAIC project, the focus of this expansion will be aimed at metadata, data harmonization, service interoperability and data and service sharing.

G-MOSAIC data infrastructure requirements are expected to be somewhat parallel to those of the Fast Track Emergency services. Liaison with ongoing and new projects is, therefore, highly desirable. Several G-MOSAIC partners are already active in emergency oriented service development (e.g. PreView, RESPOND).

B.3.1.2 European dimension of G-MOSAIC approach

Currently, Europe is facing a diversity of security challenges that requires primarily flexible and high quality sensitive information systems; timely responding to crises requires a capability to exploit large flows of complex data for a range of security actors.

It has been recognized that space assets can bring both, a unique and a complementary contribution to these security information systems. A recent independent evaluation of the European Commission's approach to address inter-linkages between natural resource management and conflict confirmed in this regard, reports that satellite-based observation and global monitoring may substantially contribute to the information and data requirements needed for political response to environment-related and other security threats [R12].

The key is to provide information available within appropriate time-scales for different tasks of policymaking – long-term/strategic (conflict prevention), medium-term (early warning) and short-term (crisis management).

Among these are not only 'hard' security factors which are of particular relevance during crisis intervention and management, but also identifying 'soft' factors such as land degradation and resource scarcities

leading to competition and livelihood insecurity. Factoring these factors in, will allow for mutually supportive integration between environment, development and conflict prevention policies by supporting early recognition and response to the complex interplay of various factors leading to crisis.

From a regulatory point of view, even when Member States are in charge of security related tasks (e.g. repatriation of EU citizens), their interventions are situated in EU level agreements and directives: this is fully endorsed in the GMES Security main concepts, that are based on the ideas of the European Security Strategy: "**no single country is able to tackle today's complex problems on its own**" [R4].

Given that, G-MOSAIC proposed activities are, of course, relevant to a European context, where National positive impacts are a consequence. Indeed, earth observation capabilities from space, are a challenging technological mean to support the protection of European Citizens against "**distant threats**" that "**may be as much a concern as those that are near at hands**" [R4].

In coherence, the research and development activities, carried on in the project, need European framework; they are fully in line with GMES Initiative, concerning the heritage from the precursors, the liaison with on-going projects, and the construction of future activities. Moreover they are linked to past PASR Program and to the on-going 7FP Security Theme.

These statements are among the basic concepts that built G-MOSAIC proposal, and are further illustrated in Table 3-1.

Project Name	Funding & Timing @May08	Liaison with G-MOSAIC	Involved G-MOSAIC Partners
LIMES	FP6, 17 months of activity	Innovative EO products and service chains will be operationally exploited in the new G-MOSAIC service scenarios, both for intelligence and situation awareness and for Crisis management operations.	TPZ, Thales, Astrium Group, DLR, JRC, GMV SA, Eurosense, SRC-PAS, IAI, FRS, Planetek PLUS_Z_GIS
GMOSS	FP6, completed	Innovative algorithms and software needed for the automatic interpretation and visualization of imagery including feature recognition, change detection to be used in GMOSAIC service chains	UniBas, DLR, JRC, King's college, JRC, TNO, , EUSC, Joanneum res, PLUS_Z_GIS
Astro+	FP6 PASR, completed	Use of the integration of technologies EO, NAV and CPOMM already tested in Astro + to develop new space services for security within G-MOSAIC.	Astrium, INDRA ESPACIO, TPZ, DLR, FRS, IAI, Infoterra, SRC-PAS, EUSC, Skysoft.
Geo-CREW	FP6 PASR, completed	Study on feasibility of Geo-Spatial data for improving situation awareness to be used by G-MOSAIC for enhancing its service chains.	GMV SA, DLR, JRC, Planetek, Eurosense
OSIRIS	FP6, 19 months of activity	Utilize the overall efficiency of the in-situ data processing chain developed within this project.	Thales, GMV SA.
WIN	FP6, completed	Integration within G-MOSAIC of the architecture of the info-structure optimised in terms of use of state-of-the-art information technologies and high capability to inter-operate data, services, and risk managm. Actors.	TPZ, TAS-F, GMV SA, JRC.
GEO-LAND	FP6, completed	The Food Security and Crop Monitoring Observatory (council regulations on Food Aid Policy, Environmental Measure in Developing Countries), can contribute to the identification of Service cases related to migratory routes and Crisis indicators	Infoterra GmbH, Infoterra France, Infoterra UK, Astrium SAS, Joanneum Research, DLR, JRC
BOSS4 GMES	FP6, 6 months of activity	To provide the technical, financial and contractual foundations which will enable the transition of GMES from a concept to an effective, operational programme, and, in doing so, to link GMES with key political decision makers, a broader sphere of users and the wider public.	Infoterra UK, Astrium SAS, TPZ, EUSC, Indra Espacio SA, JRC, LUISS, Infoterra France, Arsenale Nov., Infoterra GmbH, Thales, Alenia Space,
GSE- LAND	ESA, 31 months of activity	Tracing and mapping of evolution of artificial land cover. All validated products (Corinne Land Cover) available on the geo-data server can be used by G-MOSAIC within its Service chains.	Astrium group, Indra Espacio, Infoterra France, Infoterra UK, Planetek, Eurosense
SeNTRE	FP6 PARS	Updated strategic research plan for European Security for G-MOSAIC to achieve wider interoperability of the best possible security systems in Europe. Network of Users to link and support for the future EC advisory board for security.	IAI, FRS, Thales group, EADS, Finmeccanica
RESPOND	ESA	Provision of reference maps for remote African regions	JRC, DLR, Infoterra UK. PLUS
CHORIST	FP6, 24 /36 months of activity	Solutions to increase rapidity and effectiveness of interventions following natural hazards and industrial accidents, in order to enhance citizens' safety and communications between rescue actors.	Thales Communications, EADS, JRC
WISECOM	FP6, 20/21 months of activity	Wireless Infrastructure over Satellite for Emergency COMmunications, to study, develop, and validate by life trials candidate rapidly deployable lightweight communications infrastructures for emergency conditions.	DLR, Astrium, Thales, Alenia Space France

Table B-20: G-MOSAIC Liaison with other European Research Activities

Concerning the impacts on research and innovative activities on going at the time of G-MOSAIC lifecycle, these are strongly related to GMES Initiative, in particular LIMES, Emergency and Land FTS; in fact these projects will pre-operationally validate algorithms, products and Core Services that could constitute building blocks for G-MOSAIC portfolio, as it will be analysed in WP4000 and implemented in the "thematic" WPs (WP2000 and 3000).

On the other hand, G-MOSAIC will design and investigate new service scenarios, new service chains and complex products deliveries, new methodologies that will impact on the definition of GMES Governance, GMES Architecture, GMES Service Portfolio.

GMES Security innovative services will also impact on on-going research activities relevant to the development of Systems for Security, such as the projects funded in the 7FP Security Theme, by providing innovative EO based services to be integrated in complex systems.

As a long-term perspective G-MOSAIC services and architectural solutions will contribute to the building up of a **security system of systems** based on a broader interpretation of the "security" concept which will address homeland, border and external issues, both natural disasters and human crises and will integrate advanced technological solutions, such as rapid mapping, in a common framework.

G-MOSAIC will contribute into the definition of common EU security needs by federating wide community of users from the different domains of application.

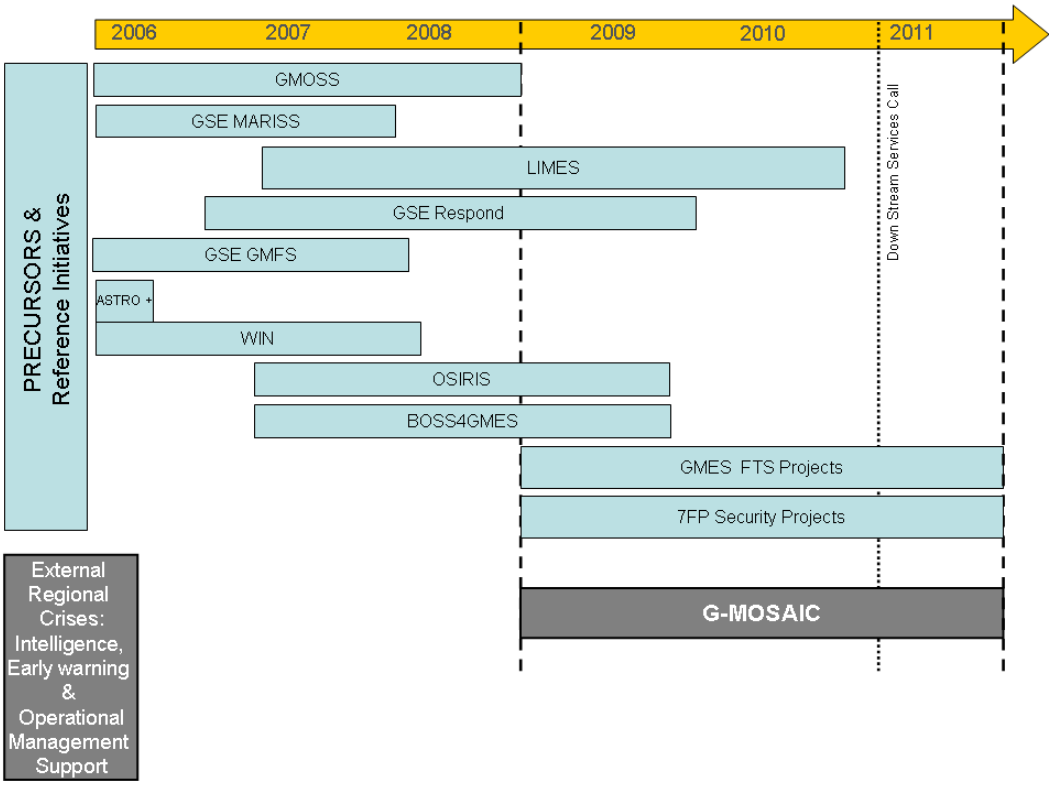


Fig. B-13: Timeframe of G-MOSAIC project and the EC related activities

B.3.1.3 Steps and external factors to bring about the impacts

G-MOSAIC project is structured in order to facilitate and maximize the impact, of the pilot services and main concepts developed, on:

- GMES initiative
- EU research
- EU and national policies
- EU space sector

The main steps that can be identified among G-MOSAIC activities, bringing about the previously described impacts are:

- An effective dissemination strategy,

- The selection and tuning of few, but well representative, service cases to be pre-operationally validated (end to end from definition to user appraisal),
- The allocation of highly qualified personnel effort (at project management level) devoted to continuously interface GMES Bureau, other GMES projects and stakeholders,
- A continuous contact with Users, where a great importance is given to the project tuning towards users needs and users workflow.

The G-MOSAIC impacts are related to some relevant external factors.

One of the most important is the awareness of the Political level. It is fundamental within the security domain to mobilize various political and institutional actors at EU and national level, due to the fact that G-MOSAIC users belong to this context. However, it needs to be taken into account that institutional tasks are strictly linked to citizens needs, as citizens are the originators of political consensus, and financing.

In order to make the national and EU political level progressively more and more aware about the innovative security services implemented by G-MOSAIC, two different ways of communication will be pursued: at institutional and public opinion level.

G-MOSAIC will rely upon the progress of FTS, that will be integrated in the project as already validated building blocks. Even more, owning to the very specific high demanding needs of G-MOSAIC in terms of data confidentiality and tasking, it will be of great importance to rely on an effective and timely specific channel to access the data of ESA-DAP, and of all the newly available missions. In this domain, G-MOSAIC will support a keen monitoring of GMES ongoing activities.

In other words, G-MOSAIC can be seen as a demanding client of parallel GMES initiatives, where involved users will play an extremely important role in defining new needs for GMES services and expressing appraisal on their performance and utility.

B.3.2 Plan for the use and dissemination of foreground

B.3.2.1 Dissemination Strategy

G-MOSAIC project deals with geo-spatial services for security applications; this means that main issues are sensitiveness of data, confidentiality of exchanged information, restrictions on dissemination of results, on dissemination of details on service cases scenarios (areas of interests, operational situations, etc.).

Nevertheless an effective dissemination strategy is definitely necessary in order to achieve a good diffusion of G-MOSAIC services to target users in their operational life and to guarantee a good exploitation of project results after the end of the activities.

The overall objective of G-MOSAIC dissemination strategy is to disseminate knowledge on the potential impact of G-MOSAIC to the Security related User Community (DG ECHO, DG RELEX, EUMS, Council, National Ministries of Defence, National ministries of Foreign Affairs) and to contribute to build a political consensus around GMES Services for Security.

To reach this goal, work to be undertaken, for dissemination activities, will be split in two stages:

- Firstly by working out an adequate dissemination/communication strategy
- Secondly by implementing accordingly appropriate dissemination/communication activities and producing the relevant tools

At both stages, the Security "users", who will be the future "customers" of G-MOSAIC Services will be addressed, to get their advices and inputs.

The goals of the dissemination effort are:

- to advise on how, and what, to communicate, to "who",
- to improve the communication about the possible impacts of G-MOSAIC onto the European Security related activities,
- to contribute to an effective perception of GMES in the Security user community,

- to develop communication tools based on clearly identified topics, that are of interest both for the institutional management level and for the citizens. (E.g. specific "case stories" put in the form of attractive journalistic reports regarding real life threats against European tourists or workers abroad).

Besides the results of pilot service pre-operational deployment, and of the contribution to the definition of a suitable GMES security services portfolio, another relevant G-MOSAIC output, whose dissemination can facilitate the exploitation of results, is the contribution to the definition of a GMES Security road map based on sustainable architecture and funding, towards security community institutions.

In terms of dissemination of G-MOSAIC products and services, the following text (coming from the requirements expressed by several Commission services and already indicated in the Work Programme of the call) shall apply:

"In addition to the access to G-MOSAIC products and services by the classes of users referenced in the project, access to G-MOSAIC products will also be granted as follows:

Information and products delivered by the G-MOSAIC project will be made available on a royalty-free basis for use in research and development activities funded by the EU 7th framework programme, and for the activities of public authorities and downstream service providers when such activities involve developing, implementing and monitoring community policies related to the environment and security through research or operational activities. The entities that benefit from this access shall be required to provide feedback to the project on the use of the provided information.

Where appropriate, the information and products should become a public good as far as possible, and should also be made accessible to international initiatives such as GEOSS under similar terms.

The owner(s) of the information may negotiate, on a case-by-case basis, license fees for use that generates income for the user."

B.3.2.2 Exploitations of Project Results

In the framework of the European Space Policy, and of European institutional position with respect to Security and Environment, G-MOSAIC project lifecycle falls in a unique, challenging and promising period:

- Innovative space missions, both at national and European level will be on orbit;
- Space based EO services, developed in the framework of GMES Initiative, are in progress to become operational assets to be routinely exploited;
- Security issues, especially those ones related to external crises, are recognised as closely linked to global environmental issues;
- Security is a preliminary condition for a balanced, sustainable and peaceful development of the European Union and of neighbour developing countries (such as African ones).

This list already provides a sound rational that Partners involved in G-MOSAIC activities will be able to exploit the achieved results not only in their integrated offer, but also in their specific innovation elements.

In fact, in line with GMES and Security related pre-operational research activities, G-MOSAIC Consortium will contribute to build a European service network for security that will involve some of the main industrial, research, public and no-profit actors with a relevant degree of continuity in time.

The above mentioned concepts bring to the identification of two opportunities for exploitation of G-MOSAIC results:

<u>For EU Institutions and National Governments</u>

As it is happening for Fast Track Services, G-MOSAIC Pilot Services, and more generally speaking GMES Security Services, will be scaled-up to implement a GMES Security Services Portfolio, once the development process, bringing to a clear User Segment Identification and pre-operational services validation, is successfully completed.

In line with the up coming GMES Governance, Core Services for Security, as soon as validated, will be part of the "common European information capacities".

Such exploitation will be implemented jointly by G-MOSAIC Consortium partners within the frame of proper agreements that will regulate the roles and responsibilities of the partners for a co-ordinated operational exploitation in Europe.

In particular, once operational, the G-MOSAIC service portfolio can be contracted with the relevant European Authorities (possibly in co-ordination with Member States) based on specific SLAs defined during the project execution.

In the World-wide Market of Security related services:

According to their relevant IPR on generated knowledge, each G-MOSAIC Consortium Partner will be able to exploit the project results on a commercial basis also outside of the European context.

As demonstrated by the MARISS pre-operational services (ESA initial project plus two follow-up extensions) , the EO based security services have to be integrated within a more comprehensive set of technological offering; therefore the co-operation among the G-MOSAIC Consortium partners in terms of available complementary competences, technologies and market presence will be a valuable asset for success at international level.

Consequently, G-MOSAIC services will be designed and implemented taking into account this concept and the involved partners will practice their capabilities to integrate geo-spatial services into complex architectural scenarios and to commercially promote integrated solutions in order to tackle the real market opportunities with a significant competitive advantage with respect to other industrial players.

Role of G-MOSAIC Users

For both the identified market opportunities User involvement in G-MOSAIC processes is a mandatory requirement. G-MOSAIC, such as LIMES, is an excellent context for promoting GMES security services, for rising awareness on their impact, for facilitating the creation of a User Group at European level possibly with an inter-pillar horizon, for establishing a fruitful dialogue between demand and supply.

B.3.2.3 Management of Knowledge and of Intellectual Property Rights

The Intellectual Property Right Management intends to fulfil the following purposes:

- Stimulate an effective co-operation among the partners during the Project implementation;
- Encourage an innovative contribution from all the Partners independently from their work-share;
- Protect the commercial interests of the Partners;
- Facilitate further research developments and commercial exploitations.

In general terms it could be recalled that exploitation will be implemented jointly by the involved partners within the frame of proper agreements that will regulate the roles and responsibilities of the partners during the potential subsequent commercial phase.

While the partners do not envisage, at the moment, critical issues regarding sharing and implementing the results of the project, the proposal recognises the general rules governing the IPR issues, as normally enforced by the EC draft contract model.

The Consortium Partners will agree on pre-existing know-how written on a document that is part of the consortium agreement, and that knowledge developed by any contractor in the frame of the Contract entirely on its own investment shall be considered as Pre-Existing Know-How.

The Partners will agree that Access Rights when applying to Software do not comprise access to Source Code but only to Object Code.

Specific 7FP documentation (issued by EC ad guidelines and checklists) such as Guide to will be followed for the definition of Intellectual Property Rules and of Consortium Agreement, where the above mentioned issues will be clearly managed and agreed among all the Partners.

In case of selection, G-MOSAIC Coordinator will prepare a detailed consortium agreement document which will be submitted to the members of the consortium for approval before the kick-off meeting. After signature a copy will be also distributed to EC.

The project coordinator intends to complete the process of preparation, Consortium review, and signature of the Consortium Agreement during the negotiation phase and, in any case, before the project kick-off.

In all matters of intellectual property rights and procedures, the intention is to benefit the public at large, while respecting the legitimate rights of intellectual property owners.

Inside the GMOSAIC programme, Access Rights issue can arise about:

- Non EO Data: this data can be provided by Users and in this case the IPR issue should be defined as an aspect of the SLA (Service Level agreement) or can be provided by a partner of the G-MOSAIC consortium and in this case the issue is regulated by the *Consortium Agreement.*
- Building Blocks: these products can be provided by a partner of the G-MOSAIC consortium and in this case the issue is regulated by the *Consortium Agreement.*
- EO data from Data Access Portfolio (DAP): this data shall be provided by ESA and in this case the IPR issue will follows the DAP rules.
- Service Chains: these products can be provided by a partner of the G-MOSAIC consortium and in this case the issue is regulated by the *Consortium Agreement.*

The following matters are regulated by the Consortium Agreement, for them the prior written approval of each owning party is needed:

- The terms and conditions under which G-MOSAIC partners can exploit capabilities developed previously by other partners
- The templates and agreements for partner's logos on products that integrate capabilities from several service providers
- What can and cannot be done with products created by one partner within the product and service delivery infrastructure of another partner.
- The product provider responsibility with respect to upstream providers commitments to deliver input data and information products within integrated service chains (i.e. where one partners activity is critically dependent on the inputs from another partner during a service trial) shall be included in the Service Level agreement (SLA)

In the Annex C: GMOSAIC Building Block , specific columns defines IPR Owner and the Building Block Availability for GMOSAIC project.

B.3.2.4 Contributions to standards

As an applied research project in the relatively new domain of civil security, G-MOSAIC builds on the current developments in terms of interoperability and standards. In this context the INSPIRE directive provides a broad harmonisation framework in order to ensure operational coherence between the various building blocks aimed at establishing a European wide infrastructure for spatial information in support of the Community environmental policies. G-MOSAIC is expected to give a major impulse to expand the scope of INSPIRE directive guidelines to the security related policies. Given the scope of the G-MOSAIC project, the focus of this expansion will be aimed at metadata, data harmonization, service interoperability and data and service sharing. Most of the technical INSPIRE standards are derived from established international standards, typically originating in the ISO/TC211 committee. However, for mapping a number of other standards exists that requires analysis in G-MOSAIC. These standards are related to long term coordination efforts in the security community, and primarily aimed at common mapping symbology, digital

formats and system interoperability. The DIGEST and MGCP (VMAP) are two prime examples. A more recent Homeland Security Mapping Standard (ANSI-INCITS 415-2006) is evolving to support emergency response mapping requirements.
Beside these official standards, there are a number of industrial de-facto standards that are typically bound to software product suites. Increasingly, these standards are based on open XML-based protocols (e.g. KML, GeoRSS, SVG), and are usually derived from existing standards (e.g. GML). The consideration of these standards is important, as they allow new functionality that is often beyond those that are based on agreed official standards (e.g. OGC compliant standards). This is particularly evident for the recent "Earth viewing" applications (e.g. Google Earth, Virtual Earth, WorldWind), which combine access to very large image data sets with integration of geospatial features data and sophisticated visualization functions (3D, time animation). Furthermore, detailed application programming interfaces (APIs) are evolving that allow rapid integration of the new standards in tailor made functional modules. This is obviously very relevant for G-MOSAIC's security scenarios and will be addressed during the project duration.

B.3.2.5 Contribution to policy developments

Today the focus of the EC project is to develop a range of technologies applications that can fulfil security (in the G-MOSAIC case: regional crisis) scenarios. This is the case of all PASR projects, followed by 7th FP security. A broad work of definition scenario has been done by different sectarian projects, showing that a "common" approach can be defined by the user community. This rational approach, largely adopted by most of the projects (scenario definition, capability definition, then technical development or technical solution) was a very positive step: it has obliged to reconsider technologies to be developed not only for the sake of the technology itself, but also with the users. The approach has showed however some limits. Those limits are not to be analyzed as some weak points in the WP's coming out from the teams: it deals with intrinsic limits of the exercise. European "security" is somehow at a very theoretical stage, as there is not a real European authority but, at least, coordination exists on the institutional side. The security definition is often indicated as a priority in some important EU texts, such as the Solana strategy "A secure Europe in a better world", but has not been translated yet in mandatory council decisions. This lack is linked also to the problems related to the reform of the European institutional asset. On the other hand, the Commission keeps pushing for applied technology for security. There is a kind of "inter-pillar" schizophrenic approach to this problem, in which the Commission goes on without the Council to provide the logical political framework. Institutions development does not have to be perceived as a rational operation; therefore today technological spin off for security must be considered as a positive push for European integration. Nevertheless, the development of technologies and systems for security will soon produce mature and effective applications that will call for European institutional mechanism in order to govern operations and procedures that until now are national sovereign. In the case of G-MOSAIC an important s to define some governance mechanism, with safety capabilities and a security department, setting up a set of procedures which defines a loop with European Institutions and MS. This is already a decisive step where G-MOSAIC would be able to suggest and implement solutions for security related issues. Nevertheless a further step will have to take place if some policy decision will have to be taken for the management of security issues of a working GMES system.

G-MOSAIC regional crisis focus limits the range of its applications. However it calls into a wide range of users, from NGO's to civil protection, EU directorates and even defence administration. The different services are a technical response to some security/institutional problems: here the techniques define different levels of "security" associated to the services, bringing then some secondary effects: not only the nature of the user organisation, but also the application and the use are critical issues. This is a modern matching approach between classic institutional security definitions (for example defence/civilian, confidentiality levels) which correspond to the need to be "function" oriented. It is not the aim of G-MOSAIC to propose such an evolution, but this is a key element to be taken into consideration in order to contribute to a GMES roadmap to cope with future needs. This is why G-MOSAIC is a typical example of technological push for security that will contribute to policy developments, as it will require an enhanced political framework of governance.

B.3.2.6 Risk Analysis and contingency plan

No potential risks (real or perceived) are foreseen for society/citizens associated with the project .

Risk analysis applied to the achievement of G-MOSAIC objectives, and of significant project results has been preliminary performed during the proposal preparation and it has been taken as a reference while designing the study logic, whose purpose is also to minimise risks and bad performances during the work flow.

The analysis, reported in the table below, will be one of the bases for preparation of the management plan for project kick-off. The G-MOSAIC risk analysis will be regularly updated during the project (WP1000) lifecycle to ensure optimal progress of the activities.

WP leaders will be the main responsible of the control of the risk and contingency plan; the whole risk analysis and contingency activities will be managed by the Coordinator, with the help of the Executive Board.

Following table is a preliminary risk analysis, performed during proposal preparation. It defines also possible contingency plans to mitigate these risks:

Identified risks	Contingency plans
Management difficulties, due to low commitment of the Consortium Partners, size of consortium, heterogeneity of partners profiles.	The choice of the main industrial G-MOSAIC partners have been made, in order to get a strong commitment of partners willing to progress with real long term business objectives; the number of the Consortium Members has been kept under 40 with a significant budget share given to each partner. Different profiled partners will work together in concrete activities, within the operational WPs, especially during the methodology definition phase, thus establishing a common language and a common working practice. Executive Board activities, whose participants are the main partners of the Consortium, will guarantee a seamless support to the management and control on project status.
Weak User Involvement	G-MOSAIC Users are few Institutional Entities at European and National level, strongly interested in improving their geo-spatial intelligence capabilities. They have been interviewed during the proposal preparation, and the proposal has been written trying to reflect their inputs. The study logic main driver is an operational effective involvement of Users starting from the beginning up to the end of project lifecycle; they will design together with the Consortium the service cases and will receive pre-operational service products and outputs. "Think Tanks" Partners have been involved in the project to facilitate the communication between Users and Industrial Partners.
Low liaison with on going activities within GMES Initiative and Security at European level	A specific Task has been included in WP1210 (with effort allocated) to communication exchange (papers, meetings, presentations, etc.) between the project (at coordination level) and the GMES governance entities; effort will be also spent for a liaison with on going Security R&D activities. Moreover WP4000, strongly linked with Thematic WPs and Architecture activities, will perform dedicated studies and designs related to GMES inputs (from out of the project) and GMES relevant outputs (produced by G-MOSAIC, for the GMES Community). Being TPZ Coordinator of LIMES, Infoterra and Thales leaders of other GMES projects, many of the Consortium partners involved in these activities, the liaison between G-MOSAIC and GMES and Security Initiatives at EU level will be strong and fruitful.
Pre-defined services portfolio and service cases not compliant with User operational Scenarios	The Thematic WPs structure has been designed trying to minimise this risk. In fact each Thematic WP, with the Coordination of the WP2100 and 3100 will start since the beginning of the project to design service cases with Users (on the basis of their service scenarios); since the beginning each thematic WP will contribute to complex service cases, and the G-MOSAIC value addition will come from these complex scenarios and not from the single product\service chain.
Difficulty to work on common architectural solutions for services delivery and integration with other user systems.	Architectural design and common portal implementation activities will be strongly linked to the thematic activities, to the understanding of standards, to the GMES Initiative inputs, to the understanding of User Systems. A conservative planning has been foreseen, as G-MOSAIC portal prototype will be implemented in an incremental set up, in order to build tools that can be really used and whose concepts can take into account of the first delivery results and appraisals. Moreover, Project team is a sounded combination of thematic experts, users, system engineering, and service providers.
Low interaction between Thematic WPs, and Transverse WPs	Thematic activities will ensure, from one side, a strong and continuous link with Users and, from the other side, a strong link with the architecture and funding model WP (that among the other results is expected to deploy a prototype for a common portal for services delivery). The GMES initiative related WPs will guarantee a further liaison among the different project activities, and a communication channel of results and of inputs with the GMES Governance and on going initiatives (i.e. between G-MOSAIC and "the rest of the world"). The implementation of the above described concepts is in the Project Reviews\Milestones design that is always relevant to both Thematic WPs and Transverse WPs results. WP1210 specifically include these tasks among their objectives.
EO Data provision limitation	Due to lower priority of G-MOSAIC requirements with respect to FTS projects, for budget reasons, a limitation (either in quantity or in timeliness) in the EO data provision could occur, concerning G-MOSAIC service cases. In case of reduced EO data access, the service cases proposed by G-MOSAIC could be down scaled, reducing the areas covered. Another possibility that will be taken into account is the direct bi-lateral agreement with data providers.

Table B-21: Main Risks & Recovery Plan

B.4 Ethical issues

	YES	NO
Informed Consent		
Does the proposal involve children?		X
Does the proposal involve patients or persons not able to give consent?		X
Does the proposal involve adult healthy volunteers?		X
Does the proposal involve Human Genetic Material?		X
Does the proposal involve Human biological samples?		X
Does the proposal involve Human data collection?		X
Research on Human embryo/fêtes		
Does the proposal involve Human Embryos?		X
Does the proposal involve Human Fatal Tissue / Cells?		X
Does the proposal involve Human Embryonic Stem Cells?		X
Privacy		
Does the proposal involve processing of genetic information or personal data (e.g. Health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)		X
Does the proposal involve tracking the location or observation of people?		X
Research on Animals		
Does the proposal involve research on animals?		X
Are those animals transgenic small laboratory animals?		X
Are those animals transgenic farm animals?		X
Are those animals cloning farm animals?		X
Are those animals non-human primates?		X
Research Involving Developing Countries		
Use of local resources (genetic, animal, plant, etc.)		X
Benefit to local community (capacity building i.e. access to healthcare, education etc)		
Dual Use		
Research having potential military / t~~errorist~~ application	Geo-spatial intelligence products could be used for peacekeeping operations, or for intelligence analysis, whilst no tactical military use is expected.	
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL		X

B.5 Gender aspects

The whole GMOSAIC consortium takes care of the gender issue and accordingly will design and define the proposed services considering the different needs and risks that women and men can face (e.g. females are by far harder hit by the conflict in Congo as males) .

Contributes for the gender issue will be addressed in activity related to

- Evacuation / emergency plans
- Population pressure
- Long range migration routes and temporary settlements along the routes
- Logistic and deployment operations
- Support reconstruction missions after conflicts

The gender aspect has been taken into account from the very beginning in the G-MOSAIC consortium composition, in order to strengthen women's empowerment and gender equality. Specific recommendation has been given to the partners of the team and all the stakeholders agreed on using their power and expertise to promote gender equality and non-discrimination in the selection procedures of key people.

A priority of the consortium is to ensure that the final team will consist of an adequate presence of women with the right position and competencies. As members of different organizations are taking part in this project, they all give their contribution to the gender equality promotion on the basis of their own policies.

Being the consortium partners mainly belonging to the following three categories Research / Scientific institutes, Industry/ Medium and Small Industries (SMEs) and Public / Governmental bodies, cited below there are the different strategies of three of the project major partners as relevant examples of bringing about gender equality.

Research / scientific institute: Joint Research Centre (JRC)

JRC takes a proactive stance with regard to promoting equal opportunities and, in particular, gender equality in its working environment. The JRC-wide network on "Women and Science", set up in 2000, continued to monitor gender equality in the organisation. Achievements in 2004 included publishing a gender perspective report, an annual report, and a new leaflet, in addition to holding seminars for new DJ JRC staff. Gender parity continued to improve with women making up 48.7% of visiting staff and 25.1% of core staff by the end of 2004.
On gender aspects of conflict and security is relevance the work done in the framework of GMOSS (see report by Nathalie Stephenne et.al. (2006).

Industry: Astrium/ Infoterra (ITG)

The company's policy for "family-friendly personnel management" aims at creating equal chances for female employees, fulfilling their role in the family as well as in the job and thus promoting gender equality. This policy comprises a bundle of measures and activities, such as:

- Flexible working hours
- Tele-work from home
- Support for care of children
- Support of advanced education during maternity leave
- Regular information events, such as: Family day, Girls day (for school children), Mother and Women date.

A company permanent internal project group has been established "Family friendly personnel management", in order to co-ordinate and supervise all these activities. The share of female employees in Infoterra GmbH is 30% (11 women out of 35 employees, status February 2003). The share of female

employees in Astrium is 14% (2001 effective) but still increasing every year with a continuous progress in recruitment (61% female recruited in 2001 against 38% male).

Industry: Thales Communications

The THALES group has initiated a few years ago a human resources process (called "people first") focused on its employees, in order to "support a clear and equitable deal with each employee which balances personal expectations and company requirements". This process is applicable by each company of the THALES group.

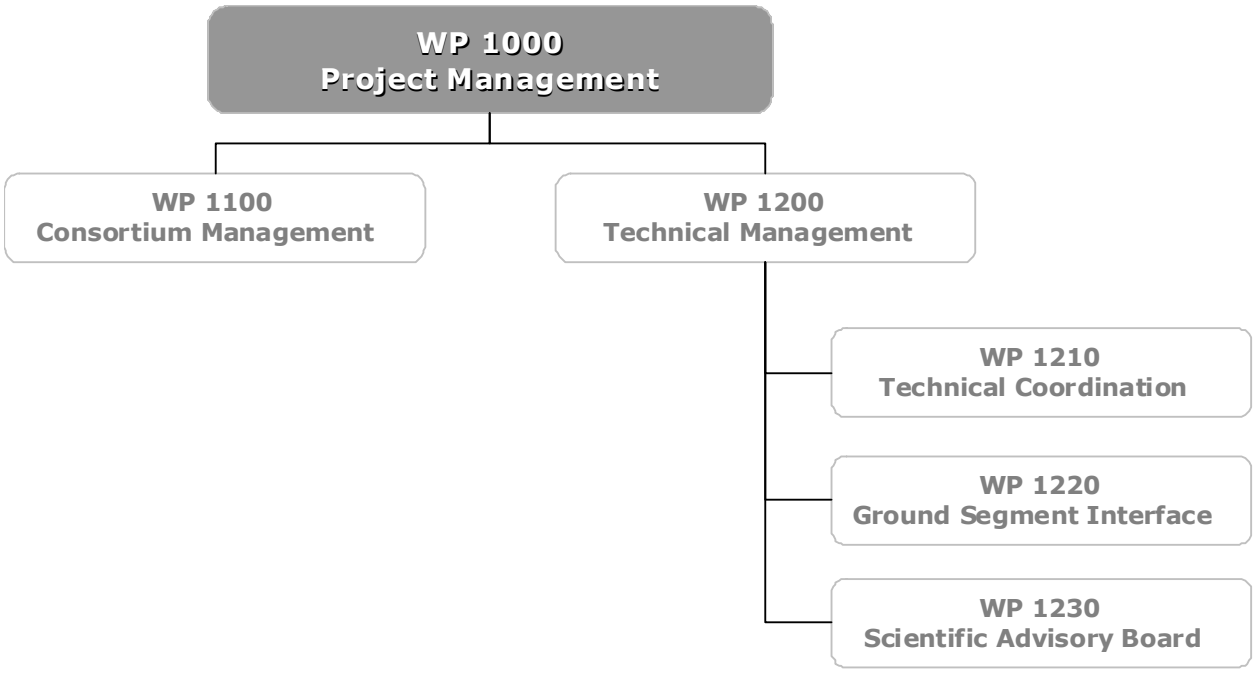
THALES Communications has gone further in the field of equal opportunities between women and men, by signing an agreement with all its represented trade unions. This agreement has mainly for objectives to ensure or improve the equality in the following topics:

- Ratio of employed women in high responsibility jobs,
- Evolution of women's career and remuneration.

B.6 Work-Packages Description Forms

B.6.1 Project Management (WP1000)

The objective is the management of the project in agreement with EC direction and signed contract. The tasks include: control of progress and performance, EC interface, delivery of documentation, technical management of the project, ESA interface (for EO data procurement), and project dissemination.



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	26	27	28	29	30	32	33	34	35	36	37	39	40	Total
		TPZ	INFOTERRA FRANCE	TCF	DLR	INDRA ESPACIO	GMV	EUSC	JRC	SRC	IAI	FRS	SCOR	TAS-I	TAS-F	AN	Astrium SAS	Infoterra UK	ITD	TUBAF	TNO	IMAA	UNIBAS	EUROSENSE	LUISS	SKF	IST	JR	PLUS	PLANETEK	CRPSM	GISAT	KCL	SYNESYS	Adelphi	SISTEMATICA	Swisspeace	
1000	1100	58,8	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	58,8
	1210	56,1	0,0	5,7	0,0	3,9	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	6,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	71,9
	1220	0,0	0,0	0,0	5,4	0,0	0,0	6,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	11,4
	1230	0,0	0,0	0,0	2,0	0,0	0,0	0,0	8,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	10,1
	1000 Total	114,9	0,0	5,7	7,4	3,9	0,0	6,0	8,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	6,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	152,3

Table B-22: Staff effort for WP1000

Work package n°	1100	Start date or starting event	T0
Wok package title:	**Consortium management**		
WP leader	TPZ		
Activity type	MGT		
Participant ID	TPZ		

Objectives
This WP deals with the activities carried out by the project management in order to assure the correct execution of the Consortium activities.

Description of work
Ensure technical and contractual interface between the Consortium and the Commission
Ensure the correct execution of the project through the following activities:

- organisation and chairing of meetings (agenda, minutes, etc),
- coordination and consolidation of the different Work-packages,
- management of the Consortium's budget and the financial allocation of the EU grant between the Contractors,
- configuration management for all documents under configuration control,
- successful execution of work-packages in terms of schedule, budget and technical objectives
- consolidation of all the information necessary for progress monitoring and assessment by the Consortium
- Deployment of the different processes and interfaces for Collaborative Project management.

Ensure the proper administrative and financial management of the Grant Agreement through the following activities:

- Administer the Community financial contribution regarding its allocation between partners and activities, in accordance with the grant agreement and the decisions taken by the consortium. The coordinator shall ensure that all the appropriate payments are made to the other partners without unjustified delay;
- keep the records and financial accounts making it possible to determine at any time what portion of the Community financial contribution has been paid to each partner for the purposes of the project;
- inform the Commission of the distribution of the Community financial contribution and the date of transfers to the partners, when required by the grant agreement or by the Commission;
- review the reports to verify consistency with the project tasks before transmitting them to the Commission;
- monitor the compliance by partners with their obligations under the grant agreement.
- Ensure the maintenance of the Consortium Agreement

Subtasks
<u>Coordination and communication</u>
The Project Manager ensure that the various members of the Consortium team communicate with each other in the appropriate ways, and that the whole set of activities proceed in a consistent way.
For the documentation management will be adopted a set of tools that are widely used and allow a large share of information with partners and, as requested, with the Commission such as MS Office suite and /or the OpenOffice.org multiplatform and multilingual office suite:

- to track budgeted and performed resources allocation
- to schedule the identified activities and to monitor their progresses
- to control actions and documentation
- to write meeting and review minutes, documents, presentations and progress reports.
  a. For freezing the document delivery, documentation will be typically distributed in PDF format.

It is clearly stated that, in case of any anomaly or event likely to cause major delays to the project schedule or significantly impact the scope of the work to be performed, the appointed Project Manager will provide a prompt information to Commission's representatives (Technical Officer and Contracts Officer), without delaying information to Progress Report issue.

At the end of the project activities, a Final Report will be produced at the end of the activity according to the size and contents instruction given by the Commission. The document will be self-standing, not requiring to be read in conjunction with reports previously issued.

Content management
An FTP server and/or a content management WEB portal, with access strictly restricted to the Consortium members, will be set up for allowing the proper distribution and sharing of documentation's files inside the Consortium.

Progress Meetings and Action Item Control
On quarterly basis a progress meeting is kept, under responsibility of the project manager and with participation of any key role identified in the project organisation (e.g. WP leaders representing the partner's organisations). Other staff resources can be invited according to the needs.
The basic items of the meeting's agenda are the reported status of each main work package and the co-ordination guidelines from the Project Manager.
The project schedule and the work progress is discussed and revised for any corrective actions should be deemed necessary.
Further to this, periodic communication with partners is established by multipoint phone conferences.
For all meetings the Project Manager will ensure that proper notice is given at least two weeks in advance.
The Project Manager is responsible for ensuring the participation of its own staff and of the partner(s) personnel as needed.
For each meeting, the Project Manager shall provide an agenda and handouts of the presentation.
The actions originated from meetings and reviews, both the official ones and the internal ones, are monitored to verify their proper execution.
The status of the actions in progress will be reviewed by the Project Manager at the planned date, if any, or at the meeting subsequent to the set up of the action.
All action items will be pointed out in the minutes of meeting to be filled in by the Coordinator.

Progress Report
Progress reporting is a management technique capable of providing information to the Control process. Each task is monitored and reported, on a quarterly basis, by means of Progress Reports to be assembled and integrated at upper level.
The progress report, written by each person responsible for a task at any WBS level, is then available to the Project Manager for monitoring and further periodic reporting.
A progress status will be provided at each official meeting with the Commission. The progress status will cover the activities of the previous period and will contain a description of the important problems and their criticality. It will also include any situation or difficulty that may cost delay in schedule or non-conformance to the project requirements or might cause changes in estimated cost.
The progress status will provide the following information:

- Top Events and Accomplished Summary of the period under analysis, events anticipated to be accomplished during the next reporting period
- Performed Activities (according to WPs, including the relevant progress %): actual versus schedule, milestones and accomplished events
- Milestone status, Milestone payment status, Status report on all long lead or critical delivery items
- Problems and Top Risks Summary, reasons for slippage and/or problem areas, if any, and corrective actions planned and/or taken, with revised completion date per activity
- Action Items Status and List, highlighting those completed during the reporting period
- Document Status List,
- Project Schedule (GANNT Chart) and expected date for major schedule items

The Annual Project Report will include according to the EC guideline also a specific public section for dissemination purposes

The Document Status List will record all the documents produced during the work, including reports, specifications, plans and minutes.
The list contains the document reference, type of document, date of issue, status (draft or approved by the Agency), confidentiality level and distribution. This list shall be continuously updated and shall be reviewed during the relevant progress meetings.

Review Procedures
Documents prepared for delivery in the scope of G-MOSAIC project will be systematically undergo to revision process by Telespazio, as Coordinator. Such deliverable items will be approved and authorized for issue, at least 2 working weeks before discussion by the Commission.
The partner's documents will be reviewed by Telespazio and review comments return to the partner within ten days of receipt.
Once the document has been endorsed by Telespazio it will be submitted to the Commission for review and approval.
Progress meeting are envisaged as key point for discussing between partners the approval of delivered items. During the meeting deliverable items will be revised and written comments (in the form of RIDs) expected from the Consortium will be properly discussed and agreed. Upon the agreement basis, deliverable items will be revised and reissued to the Commission for review and approval, in the time limit of two weeks from meeting.
Each deliverable document will include a Title Page reporting Project Name, Contract Number, Title of the Document, Reference Identifier, Author(s) and related Organisation(s), Date of Issue and Revision Number.
All deliverable documents will include as the second page a Document History Sheet, indicating for each submitted revision the corresponding date and the reason for the revision.
Each revision will be formatted in order to easily spot the changed parts with respect to the previous submission.

Role of participants
All the activities will be carried out by the project manager appointed by Telespazio senior management prior to the start of the project. He/she will be assisted by a project office constituted by a technical coordinator an administrative and financial officer and a quality assurance manager.

- Technical Coordinator responsible for Technical Management activities as listed in WP1200
- Quality Assurance & Configuration Manager – responsible for:
  - Quality control of activities and deliverables
  - General measures and actions taken.
  - Control of the project deliverables
  - List of quality forms to be used.
  - Define standards for documentation formats, numbering, approval and filling procedures
  - Configuration Management of the project deliverables.
  - Archiving & distribution of documentation
  - Maintenance of the project's Intranet to exchange file between partners (electronic project "library")
  - Preparation & distribution of dissemination materials
  - Maintenance of the project web site
- Administrative and Financial Officer – responsible for:
  - consortium contracting/legal activity
  - supports each partner for any contractual and administrative matter
  - Monitor the Annual Cost Statements
  - Establishment of the contractual framework for the relationships between TPZ and EC, including negotiation and update of the contractual relationship
  - Establishment of contracts with Consortium partners and sub-contractors, and manage the sub-contracts
  - Attendance in team meetings monitoring the compliance with contractual conditions
  - Advise project manager on contractual status and implications
  - Initialise invoicing and payment on request or approval of the project manager

Deliverables

Reference	Name	Brief description	Month of delivery
D1100.1	Annual Project Report #1	The deliverable is an Annual Project Report with a public section	T0+12
D1100.2	Annual Project	The deliverable is an Annual Project Report with a	T0+24

	Report #2	public section	
D1100.3	Annual Project Report #3	The deliverable is an Annual Project Report with a public section	T0+36

Work package n°	1200	Start date or starting event:	T0
Wok package title:	Technical Management		
WP leader	TPZ		
Activity type	RTD		

Objectives
This WP deals with the activities carried out by the technical management in order to assure the correct execution of the RTD related Consortium activities.

Description of work
Subtasks are organised as 3rd level Work Packages. See relevant WPD for the description of work.

Subtasks
This WP is composed by the following 3rd level Work Packages:
1210 Technical and Operational Coordination
1220 Ground Segment Interface
1230 Scientific Advisory Board

Role of participants
All the WP1200 subtasks are coordinated by Telespazio Technical Coordinator through the WP1210. Specific responsibilities and role of other participants are reported in the WPD of the subtasks.

Management Support Team
The participant of the WP1200 (Infoterra UK , TCF, INDRA ESPACIO DLR, EUSC and JRC) will be part of the Management Support Team and they shall assist and facilitate the work of the Executive Board and the Technical Coordinator (TPZ) for executing the day-to-day management of the Project.

Work package n°	1210		Start date or starting event:			T0		
Wok package title:	**Technical Coordination**							
WP leader	TPZ							
Activity type	RTD							
Participant ID	TPZ	TCF	Infoterra UK	INDRA ESPACIO				

Objectives

- to coordinate technically all the RTD related to the Consortium activities
- to ensure the proper harmonization concerning the WP2000 and WP3000 Operational activities, i.e. services cases definition, development, deployment and operations activities definition. One of the main goals is to be sure that resources (data, products, service chains, gateways) are used in a complementary way. As an example, the development of complementary services chains in a same geographical zone should demonstrate they bring a significant added value in support of intelligence and situation awareness in merging geo-information layers and other sources.
- to assure the proper harmonisation of WP4000, 5000, 6000 and 7000 activities with WP2000 and WP3000, for guaranteeing the suitable and efficient inputs\outputs exchange during the project lifecycle. This will be achieved with the WP4000, 5000, 6000 and 7000 leaders to consolidate the common objectives among these WPs.

Description of work

Overall technical Coordination:

- Ensure the overall technical co-ordination and technical content of the project
- Ensure technical consistency of the project and coordinate the activities carried out in the WPs:
  - 1220 Ground Segment Interface
  - 1230 Scientific Advisory Board
- Formalisation and maintenance of the detailed Consortium Plan with tasks, efforts, roles and responsibilities to direct project activities
- Ensure that the project technical objectives are met and coordinates the deliveries to the Commission
- Monitor the overall technical progress and quality of results and advice project activities in line with users demand and competitive edge
- Attend technical project meetings as useful
- Organise technical presentations both internally and externally as useful
- Prepare proposals for the General Assembly on technical concepts, technical principles and a system view as a system architect
- Support the technical assessment of the project deliverables before their submission to EC
- Support the reviews of the deliverables provided by WP2000 and 3000 for their exploitation within the WP4000, 5000, 6000 and 7000 activities.

Besides the above tasks, the following activities will constitute a specific focus of the project technical coordination team:

Start up of the project activities:

- At the early stage (kick off) of the project the Technical coordinator, assisted by the Management Support Team, will immediately put in place all the necessary management and coordination actions aiming at assuring a prompt and smooth start up of the consortium activities mobilizing the due resources. This specific task will be maintained at least for the first six months of the project life cycle. The scope is to prevent any delay in the execution of those activities that may have impact on the critical path of the project master plan.

Thematic Activities Coordination:

- Preparation of Recommendations for WP2000 and WP3000 operations including, among others, recommendation on the common processes of operations, common methodologies, geographical zones, synergies between work packages, and for the Table of Contents of the WP2X00 and 3X00 due deliverables.
- Monitoring of WP2x00 and WP3x00 activities along the project through the review of the due deliverables, the reporting from work package leaders, call conferences with work package leaders, participation to technical meetings if required.
- Reviews of the deliverables provided by WP 4000, 5000, 6000 and 7000, focusing on compliance of the info exchange with the Service WPs
- Synthesis of operational activities and production of operational plan review

Transverse Activities Coordination:

- It covers and harmonises the WP4000, 5000, 6000, 7000 Transverse Activities at a higher level, establishing the links with WP 2000 and 3000.
- It aims at providing recommendations on the common process, methodology, and synergies between the Transverse WPs through harmonized Table of Contents for WP4000, 5000, 6000 and 7000 deliverables, in collaboration with the relevant WPs leaders.

User Advisory Board Coordination

- Organise objectives and tasks for the UAB with the support of WP6100, User Engagement and Coordination.

Subtasks

Day to day technical co-ordination of the RTD activities

The technical coordinator will be assisted by the Management Support Team for the day-to-day technical co-ordination of the RTD activities consisting of the direct coordination of the 12X0 WPs and in the monitoring of the overall technical progress of the project by means of regular contacts with all the Work Packages Committees (email, internal WEB content management, telephone conferences, direct meeting as necessary).

Project Planning

Ensure the update and maintenance of the project master plan, ensure coordination and monitoring of the detailed WPs planning assuring the proper harmonisation with the master plan.

Delivery Management

Coordinates the delivery production at each Milestone assuring both the quality and technical contents of the provided deliverables and the respect of the master project plan. Gives advice and support to the 1st level WP leader in assessing the deliverables Table of Contents. Manages the project librarian activities, assuring the configuration management, archiving and dissemination of the due deliverables.

Coordination with SAFER

To set up proper and periodic coordination actions with SAFER as to avoid any risks of duplication on humanitarian crises area and to exploit effectively any useful synergy.

This coordination will be carried out, through the common partners in the two projects, both at management level and operational level.

At the management level, this task will be carried out through the Management Support Team with the objective to agree between the two projects on information sharing.

At the operational level the task will be carried out in the WP3100 "Integrated Service Cases", by DLR and the EUSC with the support of the industrial partners Telespazio and Infoterra with the objective to activate technical cooperation as to obtain rapid mapping information in case of a complex crises.

Liaison with GMES Initiative

The tasks is dedicated to keep the G-MOSAIC activities linked within overall European security policy and with the GMES initiative (it will be a bi-directional flow, where G-MOSAIC will be asked to provide comments\inputs to GMES related papers, to user implementation group reports, etc., and on the other hand it will be asked to drive its activities on the roadmap given by the EC concerning GMES governance, etc.),This information flow between the project and the GMES Bureau, shall be managed and carried on by the Coordinator, with the support of the Executive Board, and the inputs coming from the WPs deliverables.

Final project Results Consolidation and Synthesis

This task, that is started at T0+33, is dedicated to analyse and assess all final technical results (from thematic and transverse WPs), and to extract a comprehensive synthesis of G-MOSAIC achievements. From this overall synthesis, a set of high level recommendations will be also identified.

Role of participants

TPZ

TPZ is the Technical Coordinator; it is assisted by the management Support Team. It is responsible for the day-to-day technical co-ordination of the RTD activities, including planning, deliverables issuing. It also guarantees an effective link between Transverse and Thematic WPs

As WP3000 coordinator, TPZ will contribute to the coordination of transverse activities with the objectives of:

-insuring the link between WP3000 and transverse activities,
-supporting the transverse activities objectives, results and recommendations,
-supporting the technical assessment of WP 2000, 4000, 5000, 6000 and 7000 deliverables and reviews

TCF

As WP5000 coordinator, TCF will support the Technical Coordinator contributing to the coordination of transverse activities with the objectives of:

-insuring the link between WP5000 and transverse activities,
-supporting the transverse activities objectives, results and recommendations,
-supporting the technical assessment of WP 2000, 3000, 4000, 6000 and 7000 deliverables and reviews

INDRA ESPACIO

As WP4000 coordinator, INDRA ESPACIO will support the Technical Coordinator contributing to the coordination of transverse activities with the objectives of:

-insuring the link between WP4000 and transverse activities,
-supporting the transverse activities objectives, results and recommendations,
-supporting the technical assessment of WP 2000, 3000, 5000, 6000 and 7000 deliverables and reviews

Infoterra UK

As WP2000 coordinator, Infoterra UK will support the Technical Coordinator contributing to the coordination of transverse activities with the objectives of:

-insuring the link between WP2000 and transverse activities,
-supporting the transverse activities objectives, results and recommendations,
-supporting the technical assessment of WP 3000, 4000, 5000, 6000 and 7000 deliverables and reviews

Infoterra UK will also coordinate and contributes all the operational tasks providing support for related deliverables issuing.

Deliverables			
Reference	Name	Brief description	Month of delivery
D1210.1	Consortium Plan	The project plan is kept updated along the project lifecycle Consortium Plan provides the description of the work and the related agreed Consortium Budget, including the payment schedule.	T0+01 (updated when needed)

Work package n°	1220		Start date or starting event:			T0		
Wok package title:	**Ground Segment Interface**							
WP leader	DLR							
Activity type	RDT							
Participant ID	DLR	EUSC	ESA (free)					

Objectives

This WP shall ensure that the supply with earth observation satellite data, made available by ESA under the GSC-DA Grant, for the goals, research and the services of the G-MOSAIC project is properly organised primarily on the technical level. It therefore supports ESA in organising the interface with the mission ground segments of the various agencies and data suppliers. In so doing, it interfaces primarily within ESA with a dedicated GMES Security Service manager. It also has to ensure that EO data is tasked, acquired and delivered in time (if requested in near real time) to the service providers. Specifically, it shall guarantee that the technical means, stimulated in development by ESA, e.g. the Heterogeneous Mission Accessibility (HMA) is gradually implemented into the project.
This work package shall provide the liaison for Emergency Service data access requirements provision, data access/delivery validation and verification, data access/delivery monitoring versus expectation, data access/delivery functions design review.

Description of work

To ensure a working management of this task, the role is assigned to G-MOSAIC EO data interface manager – working in the project – and a full time interface manager supporting the project from the ESA side.

The G-MOSAIC EO data Interface Manager works in coordination with G-MOSAIC Project Coordinator, who is the G-MOSAIC Programmatic Interface with ESA, including DAP. The G-MOSAIC EO data interface Manager is in the G-MOSAIC Executive Board.

This G-MOSAIC EO data works in liaison with ESA. In agreement with the general GMES strategy implemented in the FP7 calls, ESA will be responsible for establishing Service Level Agreements (SLA) with European satellite data providers (both public and commercial) and the set-up of necessary technical and logistic interfaces to search and access this data. The primary objective of the project related interface manager is to guarantee the proper supply with EO data to the project, both on a case-by-case management (e.g. crisis events) as well as on establishing sustainable management and technical structures.

The detailed work of this manager – supported by partners – is described in the subtasks of this WP. The result of the planning and implementation activities will be documented in appropriate documentation. The case-by-case management experiences will likewise be collected and documented.

Subtasks

Coordination with ESA

This subtask includes the day-to-day management in supporting ESA (with regard to the needs of the project) in:

- establishing Service Level Agreements with the mission data providers and reporting service based data requirements, especially during the course of the project
- establishing technical means to retrieve and deliver the data
- coordinating data access quotas
- critically accessing the performance of the mission ground segments and the data access and delivery mechanisms established within the EC/ESA data grant.

Activities covered by ESA through the GSC Data Access (GSCDA) system

- The GSCDA will have a dedicated interface for handling emergency calls from G-MOSAIC (received via emails, phone calls TBD)
- The GSCDA system elaborates the emergency request, performs the coordinated mission planning and tasks the various EO missions for rush satellite acquisitions
- The GSCDA coordinates the data provision to G-MOSAIC, ensuring that the EO data are made available to the G-MOSAIC requested recipient (push or pull mode, as from your reqs)

Establish Delivery Mechanisms

Within this subtask, the concrete mechanisms for delivery of the data will be considered. These include:

1. Catalog search and tasking

Supporting the installation of ESA (and third party) developed and delivered tools, systems and mechanisms to task, find, search and retrieve data for the project. The major system under consideration is the "Heterogeneous Mission Accessibility" (HMA). While the concrete development and installation is taken care of in a dedicated ESA project, the interface manager will assist ESA in considering all specific upgrades required for HMA by the G-MOSAIC project. Where such an HMA interface is not (or not yet) installed, the interface manager needs to establish a mechanism for the GMES security-project to retrieve and access these data, based on electronic systems supplied by the mission operator. Depending on the phased implementation of HMA, this process is lasting during the entire duration of the project. The HMA requires also a management of the quotas for users having access to the data. This quota management is performed by the project data interface manager.

2. Rapid access to the data

This task has to tightly monitor the progress of the request and keep liaison with the Order Desk in case of anomalies.
The task contributes to the ESA lead work to establish a network of tasking- and acquisition stations, fast processing and delivery centres. It will start with the launch of the program to manage and organize available services and will gradually introduce new developments in the network.

3. Delivery to services

This task has to make sure that the acquired and processed information is rapidly delivered (i.e. electronically) to the service provider in charge. Purpose is to monitor and harmonize the means satellite data providers are connected to electronic networks and to increase the capability gradually during the course of the project.

Case-by-case data delivery management

The HMA and other ESA led mechanisms will be implemented, used and validated gradually into the project. Before their full operations, this task has to make sure that – independently of the status of the development – best effort and available systems are used to serve the security services providers and therewith their users. This "case-by-case" approach more or less reflects the current situation in the former and still on-going projects and operational scenarios.

However, for the first time case-by-case data delivery management will take into account security requirements related to Earth Observation Ground Segment infrastructure and functions including access to data. In particular, to avoid the disclosure of the geographical areas observed, HMA and other ESA led mechanisms that will be implemented might be tuned by including cryptographic tools. New procedures taking into account security constrains might also be adopted for the access to data catalogues, tasking and fast data distribution.

Critical assessment and recommendations for improvement

Important for the development of operational services will be the "lessons learned" during the development phase. This task will summarize these experiences at mid term and at the end of the project as seen by the G-MOSAIC data interface manager. These lessons will be discussed amongst the partners and will contribute to the improvement of the service.

Role of participants

DLR

Main coordinator for the interfaces to ground segments. Interface between ESA, mission data providers (to a large extend coordinated by ESA) and the project

DLR is responsible for the deliverables D1220.1

EUSC

Supporting DLR on the provision and management of Very High Resolution data from other space-borne sources (e.g. EROS, partly classified missions, etc..). Interface with ESA on EUSC User activations.

Providing expertise on Security requirements covering Earth Observation Ground Segment infrastructure and functions including access to data.

Implementing secure access to GSC Data Access (GSCDA) infrastructure and functions including access to data.

EUSC will contribute to the deliverable D1220.1 and is responsible for the data access to partly classified data.

ESA

(Contribution to the project without claiming funds): ensuring the general provision of EO data for the project thru the FP7 space data grant from EC to ESA. Supplying ESA developed mechanisms for data search, retrieval and supply. Contributing with a dedicated interface manager to G-MOSAIC

Deliverables

Reference	Names	Brief Description	Month of delivery
D1220.1	EO data access network plan, status and procedures	The report will foresee three issues during the project and will cover the following topics: - EO data access plan and procedures - Updates of DAP/R_Security services requirements for G-MOSAIC Data Access Portfolio - Contribution of EO Data to the GMOSAIC Services, and status of the services. - Suitability of GCM products and delivery, adequacy to the project requirements - Recommendations for improvements (e.g. data products, mission operations, etc.).	T0+6 T0+15 T0+27

Work package n°	1230		Start date or starting event:		T0			
Wok package title:	**Scientific Advisory Board**							
WP leader	JRC							
Activity type	RTD							
Participant ID	JRC	DLR						

Objectives
The Scientific Advisory Board supervises the scientific aspects of the work to be carried out in G-MOSAIC. It judges the scientific soundness of the proposed methodology and advices on potential alternatives. The SAB will coordinate scientific publications deriving from G-MOSAIC and represents the project in scientific panels addressing security application that are within the G-MOSAIC scope.

Description of work
The Scientific Advisory Board's objective is to assess the scientific soundness of the methods used for the proposed G-MOSAIC services, and more generally to address all scientific issues arising in the project. The SAB is composed by JRC and DLR, which are scientific leaders in security related Earth Observation and geo-spatial processing. Other internal partners may contribute to the SAB with scientific references and via an internal electronic forum for scientific exchange. Also external members may be invited to contribute to the SAB, mainly through their participation at specific SAB meetings. In this case travel and accommodation expenses will be covered by the GMOSAIC budget. In this context, CNES has already agreed to be an "external member of Scientific Board".
At service definition level, the SAB reviews the scientific basis of the functionalities proposed and advises service implementers on relevant scientific developments. The SAB organizes scientific exchange within the project by calling periodic review meetings of the partner's scientific supervisors (in parallel to technical review meetings).
The SAB is responsible for review of scientific exchange external to the project (e.g. publication, presentation to scientific user community). This guarantees a uniform presentation of the G-MOSAIC scope of the work.
The mandate and rules of procedure of the SAB will be detailed in a scientific management plan. SAB findings are reported in minutes of the SAB meeting and as separate contributions to the relevant project reports

Subtasks
Overall management
Overall management and coordination of the scientific aspects of the G-MOSAIC service development process

State of the art
The (sub-) processes on which product generation is based should be based on state-of-the-art methodologies. The scientific review ensures that the best available methods are incorporated.

Advise on available scientific development
The SAB follows relevant scientific developments in the geospatial security domain. Accordingly, it advices project partners on scientific developments that are relevant for scenario implementation and service development.

Scientific exchange between partners
The SAB will accommodate scientific exchange between project partners. To this purpose, an electronic forum will be set-up that allows active discussions between partners on adopted methods, scientific implementation issues and cross-partner evaluation of service outputs (with regard to method comparison).
In particular the SAB will assure that service chains are set-up with scientifically sound methodologies. The SAB will support the thematic WP teams in establishing validation criteria and performance evaluation, as defined in the Service Validation Plans and Reports.

Cross-cutting scientific issues
Several scientific aspects may require coordination with ongoing GMES projects, in particular with the Fast Track Emergency service development. The SAB will act as the interface for cross-cutting scientific issues;

Pre-review board for scientific publication
Presentation of scientific results of the G-MOSAIC project requires a consistent review process to assure consistency in the G-MOSAIC scope, scientific methodology used and quality of the results. The SAB will act as a pre-review board for scientific publications (journal submission, contributions to conferences, workshops);

Scientific coordination plan
The SAB will draft a scientific coordination plan at the start of the project and will regularly report on scientific issues in the relevant progress reports that will be included in the D1210.1 Consortium Plan

Role of participants
JRC

- Overall responsibility of the SAB
- Review and advisory role for security scenarios
- Set up electronic forum for scientific exchange and discussions (within the project web server environment)
- Scientific liaison with GMES services, external contacts
- Coordination of scientific exchange
- Responsible for reporting (D1230.1)

DLR

- Review and advisory role for security scenarios (focus on EO data products and processing);
- Contribute to reporting

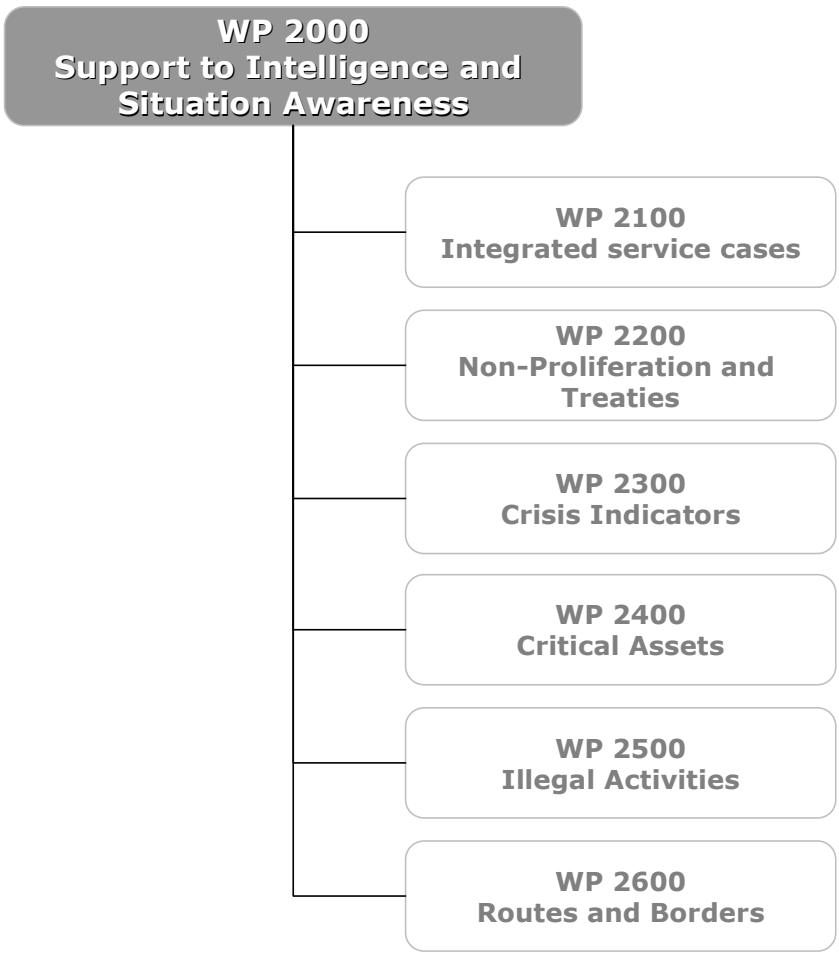
Deliverables			
Reference	Name	Brief description	Month of delivery
D1230.1	Annual Scientific Advisory Board (SAB) Report	Review of scientific aspects of the G-MOSAIC tasks issued each year during the project lifecycle	T0+12 T0+24 T0+36

B.6.2 Support to intelligence and early warning (WP2000)

The overall objective of the WP2000 is the deployment and operation of services cases in support of conflict prevention, intelligence and early warning. Within this WP, there will be identified the information services contributing to the analysis of the causes leading to regional crises, such as the evaluation of:

- synthetic crisis indicators
- the monitoring of critical assets
- borders and routes
- the movements of populations
- the proliferation of WMD
- Illegal activities.

Furthermore, it will focus on the relations of these phenomena with regional crises and their potential impact on EU citizen security in Europe and outside the European territory.



The WP2100 (Integrated Services Cases) tasks includes:

- identification of areas of interest and of user needs in these regions
- definition of service cases representing the project response to user needs
- deployments, operations and appraisal of services cases with users
- assembly of final outputs of service chains and of methodologies implementation (including human interpretation) on a common gateway(s).

Service cases are carried out and updated throughout the project lifecycle. The preliminary list (see chapter B.1.2.2.3) has been derived from first feedbacks from G-MOSAIC users. It is representative of actual situations for determining what would have been the "real" service cases list if the project had started right now.

The thematic WPs through their service chain will contribute to one or several services cases with the goal to fulfil the requested functions and capacities allowing raising crisis factors thresholds that can be observed thanks to the appropriate merging of geo-spatial information layers with socio-economic information, open source news and human intelligence/interpretation.

In each of the work packages WP2200 to WP2600, service chains consisting of appropriate elements (building blocks) organized together in a "thematic integration", .are implemented, each one addressing one defined problem (theme) related to security.

The overall objective of WP 2300 'Crisis Indicators' is to produce robust indicators based on EO and/or socio-economic data for the characterisation of upcoming/ongoing crises. A monitoring based on these indicators provides input to assessments at the regional and national level. The indicators are linked to processes that may trigger or sustain a crisis (e.g. exploitation of natural resources, land degradation, population dynamics) and that can be localised with EO data.

The overall objective of the WP2500 is to provide information on illegal activities related to natural resources in conflict areas. The present thematic WP is focussed on natural resources and their role in regional conflicts. The illicit trade in profitable resources such as diamonds, timber and others often feeds into trans-national criminal activities, fuelling corruption and reducing state revenues. Recent armed conflicts revealed the importance of natural resources for financing violent conflict by non-state armed groups.

Both WP's are linked via the service case 1 'Support to the Continental Early Warning System for Africa' and more specifically the Democratic Republic of Congo, where both WP's have a test area in the Kivu region. In WP 2300 the focus is on the 'Exploitation of Natural Resources Index' and in WP2500 on the "Illegal Mining'. The main focus of WP2300 is to identify discrepancies between exploitation of natural resources mapped using EO data and trade flows coming from socio-economic information on a national/regional level. Instead WP2500 aims for identification and monitoring of specific mines to provide evidence for illegal activities. The identification of such mines will be supported by the analysis of medium resolution imagery, which will also be used by the WP2300.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	26	27	28	29	30	32	33	34	35	36	37	3
		TPZ	INFOTERRA FRANCE	TCF	DLR	INDRA ESPACIO	GMV	EUSC	JRC	SRC	IAI	FRS	SCOR	TAS-I	TAS-F	AN	Astrium SAS	Infoterra UK	ITD	TUBAF	TNO	IMAA	UNIBAS	EUROSENSE	LUISS	SKF	IST	JR	PLUS	PLANETEK	CRPSM	GISAT	KCL	SYNESYS	Adelphi	
2000	2100	12,0	5,1	0,0	4,6	8,2	8,3	2,0	5,7	6,1	4,2	5,0	0,0	0,0	0,0	0,0	15,3	15,4	3,3	0,0	0,0	0,0	0,0	0,0	0,0	4,1	0,0	0,0	0,0	0,0	0,0	0,0	22,4	0,0	11,3	
	2200	8,0	0,0	0,0	9,7	26,5	0,0	7,0	11,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	17,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	
	2300	0,0	14,7	0,0	0,0	0,0	0,0	0,0	17,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	16,2	0,0	9,9	0,0	0,0	8,5	0,0	0,0	13,8	
	2400	0,0	0,0	0,0	0,0	12,4	34,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	6,3	0,0	5,5	0,0	19,1	5,2	0,0	10,1	0,0	0,0	0,0	0,0	23,6	0,0	0,0	0,0	0,0	
	2500	11,0	0,0	0,0	19,4	13,8	0,0	0,0	9,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	4,7	0,0	0,0	4,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	5,1	0,0	0,0	0,0	
	2600	11,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	42,5	0,0	0,0	26,2	0,0	0,0	0,0	0,0	0,0	9,2	0,0	0,0	0,0	0,0	6,0	0,0	0,0	0,0	0,0	0,0	0,0	23,6	0,0	0,0	0,0	0,0	
	2000 Total	42,0	19,8	0,0	33,8	60,9	42,3	9,0	43,8	48,6	4,2	5,0	26,2	0,0	0,0	0,0	15,3	20,1	18,8	17,0	10,1	0,0	19,1	11,2	0,0	14,1	16,2	0,0	9,9	0,0	47,1	13,5	22,4	0,0	25,1	

Table B-23: Staff effort for WP2000

Work package n°	2100	Start date or starting event:		T0				
Wok package title:	**Integrated service cases**							
WP leader	Infoterra UK							
Activity type								
Participant ID	INFOTERRA FRANCE	DLR	TPZ	INDRA ESPACIO	KCL	GMV	EUSC	JRC
Participant ID	IAI	FRS	SRC	Skysoft	Infoterra UK	Astrium	Adelphi	
Participant ID	ITD							

Objectives

The objective of this WP is to manage the definition, integration deployment and test of service cases in support of intelligence and early warning related to regional crisis (outside Europe), in particular in crisis prevention and early warning phase.

Each service case is defined during the first phase of the project in cooperation with expert users in conflict prevention and monitoring and in accordance with the user's operational context. Service cases are tightly linked to users operational scenarios and in general address complex problems driven by foreign affair politics and security issues. Service cases are the conjunction of users (needs), zone of interest and threats identified in these zones where space can, combined with other sources, bring support to Intelligence and situation awareness or crisis management operations.

In output of this activity, requirements are provided for the thematic work packages identifying for each service case, a list of crisis factors and proofs of crisis with the functions and capacities to be fulfilled by the service chains to support intelligence and situation awareness related to the area of interest.

After the first definition phase two major phases of service case "operations" and appraisal follow. During these phases the goal of the work package is

- To assembly the final outputs from thematic WPs (including interpretation) on a common portal
- To coordinate the complex services scenarios deployment and operations;
- To get users feedbacks and appraisals;
- To perform scenarios re-definition, tuning, updating.

Users: DG-RELEX (EU), EUMS (EU), SITCEN (EU), DG-DEVELOPMENT (EU), Ministero Affari Esteri (Unità Crisi) (IT), French Military Intelligence (DRM) SAG (FR)Centro Nacional de Inteligencia (E), BKA (D), Global Witness (GB), Ministere de la Defense (F), IAEA (Intern.), Italian MoD (IT), Spanish, MoD (E), Spanish Foreign Affairs Min (E), Ministério dos Negócios Estrangeiros (P), German reconnaissance institutions, FRONTEX, DG TAXUS, DG TREN.

Description of work

WP 2100 takes care of service cases from the very beginning of the definition phase to the final appraisal. The different phases of development for each service cases are traced and put in relation with deliverables in the next paragraph (list of subtask).

A preliminary list of service cases is outlined here after based on the understanding of user activities at present. This list is used for defining and dimensioning technological activities (service chains) and for evaluating the amount and type of EO data needed by the project.

This list will be updated:

- During the first phase of the project in close cooperation with user interests and their needs following a specific methodology working on a selected number of geographical regional supposed to be affected by risks of regional crises and which are considered a priority by EU and its member states, in the time span between now and the start up of the project.
- Before starting the second "service case operation" after evaluation of the first results of the previous operation phase.

For each service case the involved service chains are listed. Requirements are provided on functions and capacities requested to fulfil the service case (those capacities and functions able to raise crisis factors thresholds or proofs that can be observed thanks to the appropriate merging of geo information layers with socioeconomic information and open source news.

G-MOSAIC approach for service cases selection in support of Intelligence and Early Warning

G-MOSAIC services are primarily aimed at the scale of a country, or a region within a country or straddling a boundary area because it is the scale of conflicts.

Preliminary selection of geographical zones proposed according to preliminary users interviews during proposal preparation is:

- West Africa (Mano river basin)
- Central Africa (Eastern DR Congo …)
- Central Africa (Chad, Sudan …)
- East Africa (Horn of Africa: Somalia)
- Middle East / Central Asia (Israel, West Bank, Lebanon, Syria, Iran, Pakistan, Afghanistan)
- Southern Africa(Zimbabwe)
- Eastern Europe (Ukraine, Moldavia …)
- *Nuclearistan Republic (fiction name)*

Some of the areas cannot be publicly pinpointed. This is particularly true in the case of the "nuclear decommissioning" application where the user forces us to keep a strict confidentiality. In other cases, like the "monitoring of nuclear plants" it is too early at present time even to anticipate any name; the actual site has to be carefully selected during the early phase of the project taking into consideration political mandates, sensitiveness, confidentiality, etc

In these regions various types of threats can be considered:

- Competition and conflict along a variety of lines, including political, ethnic, religious and others
- Competition for scarce natural resources, e.g. water and soil
- Environmental degradation
- Illegal exploitation of and competition for valuable resources, e.g. strategic minerals, oil, etc.
- Trafficking in drugs and arms
- Migration of populations including refugees and internal displacement
- Non-state armed actors including terrorists
- (Transnational) Organized crime
- Proliferation of NBC weapons,

Preliminary list of factors that can be observed by space sensors or following other sources are:

- Inter-community violence: conflict between communities (ethnic, religious, etc.) can in extreme cases lead to mass slaughters and wider spread destruction. Detection of mass graves or of cutting or holes is possible through high Resolution (radar) satellites before an excavation on the ground confirms the situation. In such cases other crisis indicators, open source information can be useful to shoot on the right zone of interest. The destruction of villages (or the fact that villages are

deserted) is of course a strong indication of interethnic conflicts. Massive displacements of the population fleeing of the reprisals are also harbingers of genocides. In addition, the destruction of sites having high symbolic meaning for a community, e.g. religious buildings - churches, mosques, temples such as in Kosovo – could serve as additional indicators.

- Competitions for the exploitation of mining or oil resources: based on a few months ago experience, the exploitation of new diamond mines in Africa (area of the Great Lakes of Africa) is perfectly identifiable by comparing the surroundings utilisation of mines used and mines closed. In addition, attacks on mines and/or pipelines (such as in Nigeria) could be indicative of impeding crisis or loss of stability. .
- Competitions for the exploitation of the soils: a multi spectral analysis can make it possible to identify the soils; the monitoring of flow of population (refugees, internal or border crossing migration, etc.) can be an indication of potential crises.
- Competitions for the access to water: the space sensor is able to identify relative dryness of an area. Additionally, as previously, the monitoring of movements of human populations (and of live stocks) towards water sources or the less dry areas can be an indicator of crisis as the demand for a scarce resource continues to rise.
- Various traffics: the identification by space sensors is more difficult, because requesting at the European level a constellation of observation satellites. However, thanks to the knowledge of routes by other means such as telecommunication traffics, it is possible to program space sensors to obtain images evidence on a clandestine airport, on convoys of vehicles at the borders …
- Movements of rebels/guerrillas: the monitoring of a zone known for being used by non-state armed actors could be observed High Resolution sensors to identify whether volumes of forces or the equipment (e.g. armament) increase. Identification of new settlements in such an area is an indication of increase in the human activity.
- Terrorism: similar to the movements of rebel groups, EO could be used to identify training camps and movements.
- NBC proliferation: the regular monitoring of factories under construction (chemical for example) can make it possible to recognise irregular activities or unusual features compared to what should be expected from a 'standard' factory.
- Regional stability: Often in cases of uprisings, insurgent forces are based in neighbouring countries or use frontier regions as retreats occasionally with the approval and support (or at least wilful ignorance) of the respective countries. Space sensors could aid in identifying and monitoring troop movements including arms trade and transfers.

Preliminary service cases identified:

The geographical zones identified in the following are large beyond the capabilities of data acquisition and service provision within the frame of the G-MOSAIC project. Limitations of zones of monitoring are defined in the WPD 2200, 2300, 2400, 2500 and 2600.

SC1: Support to the Continental Early Warning System for Africa

This service case address support to European Commission Services and African nations in crisis prevention and development support, in analysis of dynamic regional exchanges, in identification and analysis of economics potentials.

Through the African Union's Constitutive Act and the Protocol on the Peace and Security Council (PSC), Member States have mandated the AU and its PSC to fulfil a substantially enlarged and much more robust role in the prevention, management and resolution of African conflicts than was the case with the Organisation of African Unity (OAU). One of the instruments through which the AU Commission is to operationalise this mandate is the yet-to-be-established Continental Early Warning System (CEWS). CEWS will link the AU Commission in Addis Ababa with the various Regional Economic Communities (RECs) such as Economic Community of West African States (ECOWAS), the Southern African Development Community (SADC) and the Intergovernmental Authority on Development (IGAD), as well as with research institutes and civil society organisations.

Earth observing satellites combined with other sources of spatial data in geographical information systems

can help in the sustainable management of natural resources, improve food security, and help to prevent and mitigate crises as well as to ensure rapid and effective response to humanitarian emergencies including forgotten crises

Possible Geographical Areas: Regional early warning units can be found in West Africa and Central Africa, in the Horn of Africa and in Southern Africa (Zimbabwe). In these regions in particular in Mano river Basin, North and South Kivu provinces of the DRC and in Somalia there are good opportunities to put an end to civil wars and the success may depend on the capability to detect early the return of crisis indicators.

Type of themes addressed: Crisis indicators (yield estimation for agriculture in Zimbabwe, population pressure, signs of the violence with lacking shelter, food and water in large areas), illegal activities (mining in West Africa, Central Africa and Zimbabwe, forests in DR Congo and Zimbabwe), extended routes (population movements such as Internal Displaced People, abandonment of cities in Zimbabwe and Somalia, migrations, refugees and militia), critical assets (urban zones, metropolises such as Mogadishu, refugee camps…)

Users: DG RELEX, DGDEV,, EUMS, SITCEN, national MoD (Italian MoD (IT), Ministere de la Defense (F), Spanish MoD (E)),, national MoEA(Ministero Affari Esteri (Unità Crisi) (IT) Spanish Foreign Affairs Min (E)) Ministério dos Negócios Estrangeiros (P)) , NGO's (Global Witness (GB)).

An example for service case implementation is given for the DR Congo:
The DRC for decades has experienced entrenched corruption, looting and mismanagement resulting in the failure for the country to develop despite the country's rich supply of resources, including gold, tin ore, copper, diamonds and timber. The country is now one of the poorest in the world according to the UN. In addition, the scramble for the mineral and timber reserves was a significant contribution to the brutal armed conflict stretching over 10 years and resulting in the deaths of over 4 million people. The Congolese army and various armed groups from DRC and neighbouring countries all plundered the natural resources and used profits to perpetuate the conflict. This was frequently done under the radar of international watchdogs and governments.
Following the 2006 elections and the establishment of a new government in 2007, ongoing monitoring is necessary to ascertain the levels of illegal and legal exploitation in the DRC's lucrative natural resources sector and the potential of these areas to contribute to renewed conflict. Interesting aspects of the trade include;

- Who is involved in the mining operations (whether industrial companies or artisanal miners)?
- Who else may be profiting (for example members of the security forces may be controlling certain sites)?
- Where is the location of illegal activities and what is the duration of activity
- What are the active transportation routes?

From such information a comprehensive picture of activity can be formed from which policy recommendations and decisions can be made. The service case should also collect information on the border areas between the DRC and Rwanda and Uganda, indicating the most used transport and exit routes, methods of transport, volumes of exports / numbers of vehicles, etc

SC2: Large population movements in and from Africa

Migrations from Africa pose a severe problem to EU and its Member States. The uncontrolled flow of migrants that reaches Europe results in illegal employment, growing amount of impoverished ethnic ghettos in large European cities, but also in the continuous loss of active and relatively well educated part of African population. The EC as well as the individual MS have long been struggling to prevent this process. The technical surveillance infrastructure based on the state of art technology (radars and thermo vision devices) has significantly improved borders (also costal borders) permeability, especially in the southern Europe, which is traditionally targeted by illegal migrants from the African region. In spite of this, only one out of five illegal immigrants is caught at this first line of defence. The rest is either dissolved in the mass of fellow countrymen already settled down in EU countries or, what is worse, die during a very dangerous sea fare from Africa.
Several attempts have been undertaken in Europe in the past in order to support monitoring and to prevent

the illegal flow of migrants with the use of EO techniques. For instance, JRC has introduced a border permeability concept and applied it to several African countries. There was also an attempt to detect camps of migrants by observing fires by IR satellite sensors. However, a concrete approach towards service description and the development of the service prototype dedicated to the monitoring of the extended migration routes is still pending a complex analyses as well as service definition and implementation.
Therefore the service case is aimed at providing early warning and the support to intelligence work via EO-technique. It intends to provide and assessment and forecast of potential crises in African region of economic, environmental (e.g. water management and competition over scarce resources) or political origins, which may lead to regional population movements possibly affecting European countries. The EO-based solutions will involve comprehensive monitoring of the migration origin and destinations countries, migration routes as well as the magnitudes and the character of the population movements (refugees, terrorist or militia movements, or activities involving smuggling military significant payloads, cargos or weaponry). In effect, the service development will serve as an early-warning mechanism in order to anticipate and monitor destabilizing mass population movements, migrations or relocations within Africa (and Asia) and prevent their negative impact on illegal immigration patterns to European countries.

Target features: The service case will focus on the three research areas:

(i) the socio-economic factors that drive the migration
(ii) the routes of the most heavy traffic of migrants across the continent, including temporary settlements
(iii) the best monitoring strategy allowing to quantitatively assess the scale of migration

The analysis of intelligence data should result in a number of indices/parameters that will later be used to determine the best sites for EO monitoring:

- The migration index that measures each country attractiveness/repulsiveness as an exit or a destination country for migrating persons. This index will be based on the analysis of socio-economical and political situation in the country of question.
- The border permeability index that will follow from the method developed by JRC but will be improved by using higher resolution images to include local scale features on and near the border.
- The attractiveness of migration routes estimated on the basis of several factors, such as the distance between the origin and the destination country, the situation in the transit countries, the available transportation infrastructure (roads, rivers, etc.), the availability of food and water supplies as well as available shelters on the way, the number of crossed borders and the difficulty with passing them unnoticed.
- The urban development index measuring the effects of the mass population movements on the metropolitan areas in the identified destination countries (illicit settlements, slums and ethnic ghettos expansion, etc.)

These data will be used to choose the several routes of most probable traffic that will be periodically monitored from satellites to assess the amount of traffic along them. Several "hot spot" locations will be chosen to be monitored more often.

Possible geographical Areas: Western Coast, Senegal, Congo, Chad, Northern Africa

Type of themes addressed: Sudan/Chad: Crisis indicators (drought, population pressure), illegal activities (traffic routes), extended routes (boarder crossing, Internal Displaced People, boarder military activities) treaty/ proliferation monitoring (peace accords); Eastern DR Congo: crisis indicator (population pressure) illegal activities (mining), extended routes (migration routes), all areas: critical assets (refugee ghettos, refugee camps…)

Users: DG-RELEX, National Intelligence Agency (CNI) (Centro Nacional de Inteligencia (E) French Military Intelligence (DRM) SAG (FR)), BKA (D)),, FRONTEX, Ministry of Foreign Affairs (Ministero Affari Esteri (Unità Crisi) (IT) Spanish Foreign Affairs Min (E)) Ministério dos Negócios Estrangeiros (P)), Ministry of Defence (Italian MoD (IT) Ministere de la Defense (F) Spanish MoD (E)).

The application of such a service case is illustrated with the following example:

The political context was explained previously (see above service case). The brutal armed conflict in the DR Congo stretching over 10 years and resulting in the deaths of over 4 million people. In addition large numbers of people were forced to flee their homes and to live in official or unofficial camps either as internally displaced people (IDP) or as refugees after having crossed the borders to Uganda, Ruanda and Burundi. The service case should also provide information on the border areas between the DRC and Rwanda and Uganda, indicating the most used transport and exit routes for refugees and mapping the border region in which the camps are.

SC3: Support to situation awareness in the Middle East Region

Regional and global destabilization resulting from chronic military build-ups and violent confrontations ("long and short wars") between Middle Eastern states has been long regarded as a threat to international peace and security. Their effects often spread out globally causing economic crises (e.g. drastic oil prices rising), political destabilization including escalation of terrorist activities, new weapons proliferation patterns as well as regional environmental degradation (e.g. oil spills in the Mediterranean). Middle East Region has been traditionally within a sphere of interests of the European foreign and security policy. Evidently, the character of the threats flowing from regional confrontation and resulting from increased tensions in this troubled neighbourhood regularly generate security concerns potentially affecting the enlarging EU and its Member States. The availability of adequate capabilities for crises monitoring is therefore within an interest of European governments and remains crucial for the realization of European Foreign and Security Policy. Moreover, the long-entrenched EU engagement into *Arab-Israeli* peace building process confirmed the importance of the access to timely information, early warning and intelligence data, which are necessary for the European policy makers and diplomats to support their efforts to create conditions for regional confidence building mechanisms (CBMs).

Monitoring of military activities along borders have a special role to play in Middle Eastern stabilization and peace-building process since these are the unresolved territorial disputes which drive key political developments and regional military confrontations in the region (e.g. Sinai, West Bank, Gaza). The proposed service case aims at providing information services based on passive and active information collection concerning border crises patterns, including socio-political factors influencing their origins and development. The development of EO-based services will enhance situation awareness in the region and will support intelligence collection concerning crises indicators. In effect they will help provide ready-to-use tools for crises forecasting and management as well as support for diplomatic engagement in regional peace-building. They will also provide possible avenues for conflict prevention through the monitoring of the observable military activities along borders such as strategic military indicators (e.g. surveillance of industrial and military developments) and behavioural patterns (e.g. arms build-ups, suspect troops deployment and change in arms acquisition patterns or destabilizing accumulations).
The usefulness of the EO data has also been proven in the context of the monitoring of other threatening and potentially destabilizing activities (e.g. border trespassing, arms smuggling, and terrorist and organized crime traffics.)

Possible geographical Areas; Israel, West Bank, Lebanon, Syria, Iran

Type of themes addressed: Non proliferation and treaty compliance (Iran) , crisis indicators (competition over land and natural resources), illegal activities (trafficking) critical assets, extended routes (Internal displacement of people in Lebanon, Israel, Syria, military activities along boarders between West Bank, Israel- Lebanon)

Users: National Intelligence Agency (CNI) (Centro Nacional de Inteligencia (E) French Military Intelligence (DRM) SAG (FR)), BKA (D)),, Ministry of Foreign Affairs (Ministero Affari Esteri (Unità Crisi) (IT) Spanish Foreign Affairs Min (E)) Ministério dos Negócios Estrangeiros (P)), Ministry of Defence (Italian MoD (IT) Ministere de la Defense (F) Spanish MoD (E)), EUMS, SITCEN.

SC4: Support to Monitoring of Activities at the Pakistani-Afghan frontier

Description: Extremist insurgents and drug smugglers slipping between Pakistani and Afghan border

create probably one of the most difficult security situations in the Middle East. In the view of European troops engagement in Afghanistan, the effective monitoring and prevention of illegal trafficking through Afghan-Pakistani border has been recognized as one of the focal points of terrorism and organized crime containment. However, the valleys and mountains on the Afghan border give favourable conditions for uncontrolled borders infiltration in both directions. Current border control arrangements proved to be insufficient (e.g. troops stationing, fencing) or highly controversial in the context of indigenous population safety and security (e.g. land mining). Therefore supporting mechanisms involving long-term international commitments based on the use of the state of art technology is needed in order to provide additional protection as well as new kinds of information to be used on the strategic and operational level by the countries engaged in the regional peace-keeping and policing missions.
The EO-based solutions (VHR and radar) are aimed to improve existing surveillance services and support situation awareness in the border area and in the zones adjacent to the border line (e.g. area security sensitivity assessment, identification of the routes used by terrorist and smugglers, potential shelters, attractiveness/repulsiveness of particular "hot spot" locations etc.) They will provide significant intelligence support in effect enhancing the border control management, more effective engagement of the forces in the field as well as overall performance of the border control mechanisms.

Target features: The work plan will focus on three research areas:

(i) the socio-economic factors concerning in particular the character of the support by the local population and tribes in the frontier area for the extremist insurgents and drug smugglers trafficking
(ii) the routes of the most heavy traffic of the illegal border-crossing between Afghanistan and Pakistan
(iii) the best monitoring strategy allowing to the assessment of the scale and the character of the illegal border-crossing and military significant activities at the Afghan frontier

The analysis of intelligence data should result in a number of indices/parameters that will later be used to determine the best sites for EO monitoring:

- The trafficking index that measures each country's socio-economic traits and their impact on specific origin, transhipment and destination locations used by the extremist insurgents and drug smugglers
- The border permeability index, including higher resolution images to describe local scale features on and in the vicinity of the border.
- The attractiveness of the routes estimated on the basis of several factors, such as the distance between the origin and the destination locations in both countries, the available transportation infrastructure (roads, rivers, etc.), the availability of food and water supplies as well as available shelters on the way, the number of crossed borders and the difficulty with passing them unnoticed.

These data will be used to choose the several routes of most probable traffic that will be periodically monitored from satellites to assess the amount of traffic along them. Several "hot spot" locations will be chosen (possibly along the 3 lines of monitoring proposed by Eurosense) to be monitored more often.

Geographical Area: border-crossing at the Pakistani-Afghan frontier

Type of themes addressed: crisis indicators (crops), critical assets (hot spots such as camps, shelters), illegal activities (illegal crops) , extended routes (migrations & traffics)

Users: National Intelligence Agency (CNI), Ministry of Internal Affairs, Ministry of Foreign Affairs, Ministry of Defence, EUMS, SITCEN, DG TAXSUD, FRONTEX

SC5: <u>Support to situation awareness in Eastern European regions and activities along borders.</u>

The Ukraine is perceived by the European Union like a potential source of "soft" security risk: the economic crisis continues there and the material and psychological situation difficult of the population, the situation alarming ecology nuclear energy are doubled by a little consolidated political system. The more the process of transition in Ukraine shows success, the more the Ukraine becomes a foreseeable and acceptable partner, while internal instability increases the "soft" security risks and creates for the Union of the scenarios of threat in the form of migrations or ecological and economic problems: an accident in one

of the Ukrainian nuclear thermal power stations would have repercussions until Western Europe.

It is increasingly recognized today that security is not just a military issue, and that the destruction and over-exploitation of natural resources and ecosystems can also threaten the security of communities and nations. Similarly, disputes over cross-border pollution or shared assets such as rivers and lakes can cause political tension and even conflict. Countries experiencing an economic transition or political stress are particularly vulnerable to environmental damage and resource competition.

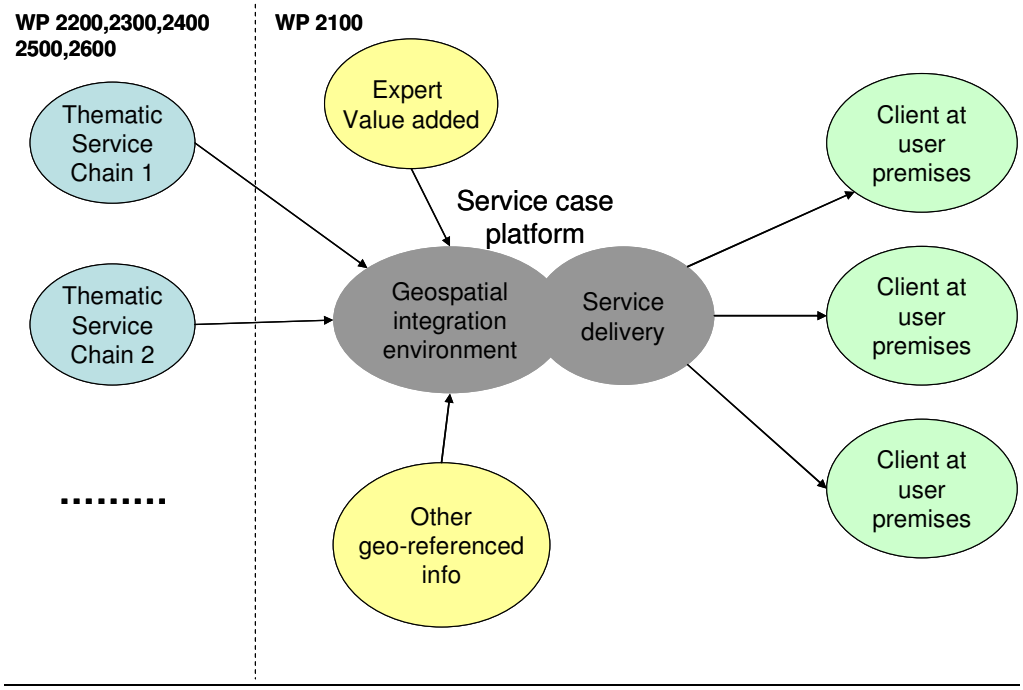
This service case on Easter Europe will monitor movements in support of various risks such as migrations, political conflicts, terrorism, traffic, military manoeuvres, suspicious accumulations and build-ups along borders of the CFE participating states in the region. Another major challenge is the ongoing Trasnistrian conflict in Moldova.

Geographical Area: Eastern Europe (Ukraine, Moldova)

Type of themes addressed: Non proliferation and treaty compliance (nuclear power plants in Ukraine) , crisis indicators, illegal activities and critical assets (energy related security, unused military infrastructure containing munitions and rocket fuel), extended routes (migrations, illegal traffics)

Users: National Intelligence Agency (CNI) (Centro Nacional de Inteligencia (E) French Military Intelligence (DRM) SAG (FR)) BKA (D)) Ministry of Foreign Affairs (Ministero Affari Esteri (Unità Crisi) (IT), Spanish Foreign Affairs Min (E), Ministério dos Negócios Estrangeiros (P)), Ministry of Defence (Italian MoD (IT) Ministere de la Defense (F) Spanish MoD (E)), DG TAXSUD, FRONTEX, DG TREN/energy operators

Generic service case workflow diagram



Thematic service chains
The source of geo-information coming from "thematic" WPs (2200, 2300, 2400, 2500, 2600).

Service cases platform(s)

The platform is the central node of the service case network and will carry out the following tasks:

- organising the data flow
- provide access to the data and products discovery and aggregation

- final delivery of data and products to the user(s)

Expert value added

This functionality allows:
- The addition of expert interpretation
- The preparation of a report or a dossier in a customizable format.

All these activities refer to the service case as a whole and address political and socio-economical aspect related to it; the final objective of this activity is to provide the users with a service tailored to their need and adopting a common language.

Other geo-referenced info
The preparation of the final delivery might take advantage of other geo-referenced information supporting the analysis of the event. This component could be, for example, the interface with an already existing system carrying out thematic analysis on unstructured information, geo-location of textual information (e.g. news).

Client at user premises

Depending on the requirements from specific users the client could provide visualisation functions only or be equipped with interactive analysis tools with the following functionalities:
- integration of additional information (not available to the project)
- interpret, annotate and edit the information provided
- 3D display and build virtual flights

User involvement:

As for other similar previous projects (ASTRO+, LIMES …) led by core members of G-MOSAIC (Astrium, Infoterra, Telespazio …), on G-MOSAIC, final end users will be deeply involved in all phases of the project.

This collaboration all along the project between users communities and space industry and laboratories allows to establish a real environment of confidence, allows to better evaluate needs and jobs of each and to build a common understanding of priorities, of the potential added value and current limits of Space technologies and services for intelligence and security operations abroad.
The role of an industry-independent group of experts is fundamental to initiate the collaboration between the consortium and the end-users. The end-user considers sometimes industrial companies only as promoters of their technologies, in only a techno-push way of working. More over the end user may not be able to provide all information except to authorized persons (FRS for France, EUSC for Council, IAI for Italy, SRC-PAS for Poland, and DLR for Germany etc…).

End user members of the consortium are intermediate users (EUSC, JRC) providing services to non members EU institutional end users and are able to easily understand the process, constraints and language of such EU end users. They have the key roles to insure, as necessary the transfer of information between these categories of end users they well interface in their mission and service/product providers.
End user are deeply involved during:
- Service scenario definition and service case specifications regularly updated based on the user feedback collection in order to guaranty the integration of geo-information supplied into user's workflows and decision making processes. Regular exchanges of documents, preliminary prototypes of products, technical meetings are organised with support, when necessary of the end user engagement program partners. During this phase, end user provide information on their requirements (functional, quality, operational …), workflows, current providers of intelligence information, in-situ, confidential information … and the service chains can be specified and designed.
- Operations of services cases in receiving products and as much as possible when appropriate, integrating products into their own workflows producing their own reports for the decision makers for whom they are working, as far as possible.

- Getting user feedback
- Service quality assessment

Subtasks

T2110 Definition of service scenarios with users

Each service case will be defined together with the user(s) with the objective of mainstreaming the newly provided geo-information into the already existing operational flow.

Defining prevention, intelligence and situational awareness scenario means to characterize a situation in which users and providers are co-operating to face a security issue.
This is achieved by:

- Preliminary identification of world critical areas and specific prioritisation by expert users for crisis prevention and situational awareness. (FRS support IAI and EUSC)
- Understanding users needs (analysis of reference policies/operational procedures/responsibilities/practices/required information and relative format); (IAI support FRS)
- Definition of capability needs (analysis of current available capabilities, identification of elementary capabilities needs matching with GMES) (FRS with support IAI)
- Defining format and content of the information provided: case of early warning and detection products (FRS with support of Infoterra FR and Astrium)
- Defining the delivery method and the architectural solution for operating the service case: case of early warning and detection products (FRS with support of Infoterra France and Astrium)

During this task the potential involved users will be identified with the support of the WP4200, their needs will be analyzed and a service case scenario will be defined together taking in account possible gender issue aspects. Moreover the users will be also involved in the definition of Service Validation Criteria
WP4200 will focus on the identification of the EU actors that contribute to the Security Services provision in terms of data, products, services, and infrastructures, both from the supplier side and the User side. The results of these WP4200 activities will be inputs for WP2000 and WP3000.
During the definition of the Service Cases scenarios with the user will be assessed also the access to user proprietary data, the level of the security and confidentiality of data taking in account that any due agreement with the user will be set up in the SLA and SLS definition in WP6300

The deliverable associated to this subtask is D2100.1

T2120 Service cases specifications

A service case will consist of one or more service chains in the framework of a typical operational scenario (i.e. with a defined area, reference policy, users involved).
This sub-task is aimed at providing the service case "technical" specification in terms of:

- Defining format and content of the information provided
- Defining the delivery method and the architectural solution for operating the service case.
- Service chains involved in the services cases.
- Integration of the service chains output on a common platform
- Further information content to be added in order to define the political framework of the service case. Such a task is aimed at providing an information service adopting the same language of the user. This will be achieved by integrating additional open source information and human expert value added.
- Definition of Service Validation and Appraisal Plan

Moreover the Service Provider will be in charge to define also the constraints for the Service Validation.
The deliverables associated to this subtask are D2100.2, D2100.3, by collecting the related inputs from WP2X00.

T2130 Operation of the services cases

Service cases are operated in this sub task. In terms of project schedule two major cycles of operations and appraisal are defined during the project lifetime.

- Collection and integration of the geo-information generated by the service chains
- Add value based on human expert analysis and integrate other open source information. This activity will be aimed at forming a framework for the service case coherent with user's language, organisation and expectations.

- Deliver the resulting "products" through a common, "network centric" platform with the format and mode defined with the user.
- Provide the users with the reference manual describing supporting the service cases operations

The deliverables associated to this subtask are D2100.4 and D2100.6 by collecting the related inputs from WP2X00 (x= 2 to 6).

T2140 Validation task: Getting users feedbacks

As a general approach the service cases will be developed, customised and tuned during delivery. In terms of project schedule two mayor cycles of operations and appraisal are defined during the project lifetime. In both cycles a partial overlap between deployment and operation phase and feedback collection is planned in order to allow for a more flexible and dynamic progress of the project. This means that the following activities will be performed within this sub-task:

- Feedbacks collection during the last part (last 3 months) of the deployment and operation phase by means of periodical meetings, questionnaire submission, interviews. Where feasible, the results of this process will be a dynamic re-tuning of the scenarios and relevant deployment and operation
- Appraisal at the end of the deployment and operation phases. This subtask includes the lesson learnt and addresses the scenarios re-definition, re-focus and update also collection of recommendation for new sensors.

The deliverables associated to this subtask are D2100.6.

T2150 Training session

A training session will be held at the beginning of the two service operations phases, for the main users. Topics of the training will address the content of the pilot services (the geo-spatial information provided) and instructions about browsing and handling such information at the user premise.
The deliverable associated to this subtask is D2100.5

Role of participants
Infoterra UK
Is the WP coordinator.
As a WP leader will be the main author of the deliverables of this WP, organizing the contributions of the partners and keeping controlled versions of all deliverables, organizing training sessions for users.

Role in all service cases:
Adelphi

- Adelphi Research contributing to
  - T2110 by providing input and expert assessment from the field of environmental governance and security
  - T2120 and T2130 by providing expert value adding and integrated political analysis including environmental factors

Astrium
As provider of common gateway elements is in charge to integrate and customize the deployment of the common gateway for WP2000 users and service providers.

Infoterra UK
As standardized data repository provider in G-MOSAIC is in charge to define appropriate standards, implement the standardized repository, deploy /populate this repository in several locations (in each provider of data/products location) and support its utilization during the experimentation phases.
Infoterra UK with Astrium support)
will participate to WP2100 providing support to:

- The definition of service scenarios with user by:
  - Defining format of the information provided
  - Defining the delivery method and standards for accessing to service cases data/products
- The service cases specifications by:
  - Specifying and implementing geo-information servers hosted by each service chain (e.g.: Web map service) allowing aggregation of the service chains output on a common data access gateway (Google like interface prototyped in the frame of the

WP5400

- The service cases operations by:
  Validating the accessibility to the geo-information generated by the service chains through the dedicated geo-information servers

The objective is to agree in the frame of WP2000 service cases deployment on data standards with representatives of the service chain and afterwards integrate a geo-information server solution for each service chain allowing access to the service chains output through a common access gateway (Google like).

In order these works can be re-used in WP3000, if requested, by other partners, Infoterra UK (with Astrium support) will provide implementation manuals.

Role in specific services cases

Infoterra GmbH (ITD) with Infoterra France
Support (for crisis indicators), as work package leader of Routes and Borders will support the development of Services cases where extended routes building blocks and service chains are involved taking the responsibility of one Service case operations among the services cases that will be selected.

TPZ
As a contributor to WP 2500 and 2600 ("Illegal activities" and "Routes and Borders") TPZ will contribute to the definition and implementation of the corresponding service cases. In addition TPZ with also play the role of focal point wrt Italian Ministries (Foreign Affair, Defence) and will take care of integration of "hybrid" service cases involving service chain from both WP 2000 and WP 3000.

SRC
As major partner of WP2600 "extended routes", SRC-PAS will contribute in the definition and implementation of the different service cases where information provided by extended routes service chains is integrated to constitute the geo-information products.

DLR
as the leader of the WP2500 'Illegal activities' and contributor to WP2200 'Proliferation & Treaties' will contribute to the proper definition and implementation of service cases relevant to the above mentioned WP's. This includes the interaction with users (e.g. Global Witness) and the dialogue with the relevant service chain providers
.

INDRA ESPACIO
INDRA ESPACIO as the leader of WP2200 "Non proliferation and treaty compliance" and contribution to WP xxx will contribute to the proper definition and implementation of the associated service cases. In particular, we remark the collaboration with JRC for the nuclear plant monitoring and with EUSC for the nuclear decommissioning. In this later case, a tight collaboration with EUSC is envisaged for the integration of all the generated geoinformation in an environment of strict confidentiality.

GMV
GMV as leader of the WP2400 "Critical Assets" will contribute to the definition and implementation of the different scenarios where information provided by critical assets service chains is integrated to constitute the geo-information products. GMV will act as interface of users dealing with critical assets related security aspects. GMV also will support in the harmonization of the different service cases and into establishing possible links between the different areas.

EUSC
As a main contribution to WP2200 'Proliferation and treaties' the EUSC will contribute to the definition and implementation of the corresponding service cases. The EUSC will also play the role of focal point for the following users: SITCEN, EUMS and French MoD SAG.

JRC
JRC is leader of WP2300 (Crisis indicators) and a contributor to WP2200 (Proliferation and treaties), and contributes to WP2500 (Illegal activities). Activities in WP2300 are of a precursor nature to other WPs, in particular to WP2500 and WP2600. JRC will be the liaison for Commission Users of G-MOSAIC services

and the IAEA for WP2200.

FRS

FRS contribution to WP2100 will be based on an expert assessment with a defined and shared methodology among the WP partners. FRS will provide guidance for elementary capabilities analysis. FRS will provide a specific action at the French and EU level.

IAI

IAI will provide support for the methodology and engagement of Italian users

Skysoft
Skysoft will be involved in the Service Case #1, support to the continent early warning system for Africa, with particular focus on the integration of geo-political data associated to PALOPS countries in aspects related with crisis prevention, development support and identification and analysis of economics potential.

KCL
Thanks to its strong expertise in the area of threats from WMD, conventional weapons as well as the areas of treaty monitoring, peace keeping operations and regional conflicts, KCL will participate providing expert value added analysis on WMD and treaties, defining the services cases and acting as the natural interface with users such as the UN and EU peace-keepers within the project.

Deliverables

Reference	Name	Brief description	Month of delivery
D2100.1	Service Scenarios Definition Document		T0+03
D2100.2	Definition of the Methodology and specification for the Service Chains and Service Cases	The report is issued twice before the operational phases	T0+06 T0+21
D2100.3	Services Validation and Appraisal plan	The report is issued twice before the operational phases	T0+09 T0+24
D2100.4	Service Case(s) Demonstrator	The deliverable is issued twice before the operational phases	T0+09 T0+24
D2100.5	Service Case(s) Demonstrator - Operational Manual	The report is issued twice before the operational phases and receives inputs from the thematic WPs	T0+09 T0+24
D2100.6	Service Validation and Appraisal report	The report is issued twice after the operational phases	T0+21 T0+33

Work package n°	2200	Start date or starting event:		T0+03			
Wok package title:	**Non-Proliferation and treaty**						
WP leader	INDRA ESPACIO						
Activity type	RTD						
Participant ID	INDRA ESPACIO	DLR	JRC	TUBAF	EUSC	TPZ	

Objectives
The overall objective of the WP is to develop and run two service chains which will provide information within the framework of services cases scenarios set-up in WP 2100
The two service chains aim to support efforts for preventing and combating the proliferation of WMD, addressable (inter alia) by verifying the compliance with the relevant treaties.
Activities will include, monitoring, change detection, mapping and visualisation, early warning, and will be focused on the following cases:

- Monitoring of nuclear plants
- Monitoring of nuclear decommissioning sites

The WP may also address a monitoring strategy for sites where a potential activity has been identified and it may lead to the conception, manufacturing or assembling and distribution of WMD.
The two proposed chains operate independently of each other; they are working in different areas and in each case a different methodology has to be put in place.

Users: EUMS (EU), SITCEN (EU), Ministere de la Defense (F), IAEA (Intern.), Italian MoD (IT), Spanish, MoD (E).

Description of work
The present WP aims at implementing two pilot service chains that would support EU (SITCEN and EUMS) and it's Member States in nuclear non-proliferation monitoring (through IAEA). Following the overall approach of G-MOSAIC, the geographical areas to be used for the purpose of demonstrating the service will be outside Europe.

Service chain 1
Monitoring of nuclear decommissioning sites

Description
The chain provides monthly information on changes produced in a nuclear decommissioning site like movement of material, arrival of new material, arrangement or modification of facilities, etc. The chain is operated with VHR radar data (1m or 3m) and thanks to the radar "all-weather performance it is expected to be a highly valuable complement to the current observation with only optical imagery which can be committed during long periods due to weather and climate. The target user is the EU Council (SITCEN and EUMS); EUSC shall participate in the activity participating in the technical work and providing valuable support thanks to their knowledge of the areas under study. No details can be provided about the actual sites to be studied due to confidentiality reasons.

The processing chain has already been developed in the frame of a previous project (ESA- DUE "CFSP Innovator") and in the frame of G-MOSAIC it shall be demonstrated with VHR data from new satellites (i.e. TerraSAR-X, COSMO-Skymed or Radarsat-2). The processing chain includes multi-temporal series analysis, semiautomatic change detection, radiometric enhancement, topography radiometric corrections, etc. "CFSP Innovator" has already demonstrated the high potentiality of radar observation over the proposed sites, but without using VHR data.

Estimated surface
The area of each nuclear decommissioning site is around 70 sqkm. We propose to monitor 2 sites.

Target timeframe
Each site shall be monitored during one year. One site shall be monitored during phase 1 and another during phase 2.

Mapping frequency
The temporal sampling shall be weekly (TBC). During phase 1 an exercise shall be performed to increase the sampling rate in one of the sites. The required data is VHR radar (1-3m) from TerraSAR-X, COSMO-Skymed or Radarsat-2

Delivery timeliness
The data should be made available not later than 48h after sensing (TBC). The product should be available 24h later.

Assessment of EO data needed:
- Type: SAR X-band. C-band also valid
- Resolution: VHR (1m – 3m)
- Mode: predefined
- Volume: one frame per acquisition. Total estimated: 25 to 50 scenes.

In addition, for validation purposes, two VHR optical images (1m resolution) shall be ordered over every site (4 images altogether)

Service chain 2
Continuous surveillance of nuclear facility

Description
The aim of the service chain is to provide a regular monitoring (e.g., once a month) of a nuclear facility in order to detect changes of infrastructure like buildings and streets and also within the vicinity of the facility. This information will be combined with other information and presented in a user-friendly way, so that end users (e.g., IAEA) benefit from the service. Several building blocks from other projects like GMOSS and LIMES will be incorporated into the service chain. Actually, we propose to reuse from LIMES the integrated framework and platform supporting the verification of treaty compliance.
This platform is targeted at the image analyst in the field of nuclear non-proliferation, who needs to collect, manage and evaluate satellite data (often in conjunction with information from different sources) in order to verify the compliance of a state with its obligations under the Non Proliferation Treaty. The main impact of the platform with respect to the existing tools is an increased automation of image analysis (change detection, object classification, SAR processing) plus the GIS-based integration of multi-source data (multi-temporal satellite imagery, Open-Source information, databases, GIS data). This platform shall be the framework where all the results from the site to be monitored in G-MOSAIC shall be put together. As such, G-MOSAIC effort will not focus on IT developments but, rather, on the actual collection, synthesis and analysis of geo-information to demonstrate the running service.

Estimated surface
The surface covered by the service chain will be one nuclear facility and its surroundings and will cover a region of about 20 km².

Target timeframe
For the time period of one year (two periods, 1st phase 8 months, 2nd Phase 4 months) the service chain will be operational and deploy a monthly change report within the facility and its surroundings.

Mapping frequency
Very high resolution EO data (Ikonos / QuickBird type) will be acquired monthly, quarterly a stereo pair will be acquired

Delivery timeliness
The delivery time of the product is, since it is not very time critical, within 2 weeks after data acquisition.

Assessment of EO data needed:

- Type: optical and optical-stereo
- Resolution: VHR
- Mode: pre-defined
- Volume : one frame per acquisition

Subtasks

Identification of building blocks
The building blocks are the elements used to implement the service chains through proper methodologies. G-MOSAIC will use already existing building block derived by previously or ongoing projects and initiatives, both GMES and non-GMES, addressing topics of interest for security purposes. WP4200 will generate a document, in the early stages of the project, listing all the available building blocks. The constituent elements for each service chain will be selected among these.

Definition of methodologies and services chains specifications
A methodology describes the process through which existing building blocks are combined in order to provide, as a result, information supporting thematic tasks. The methodologies are presented by flow diagrams which define the relation between the building blocks. The methodologies have to take into account interoperability aspects related to:

- the integration of different service chains in complex scenarios
- the integration of the service chains output in a common gateway
- the interfaces with the context data needed to complement the service chain outputs (socio-economic data, reference updated information)

Eventually, the methodology has to take into account the relation with its outputs with the scenario dossier.
Once a methodology is defined, it is implemented by setting up a work flow.
The deliverable associated to this subtask is an internal report contributing to D2100.2 and D2100.3

Services chains methodology implementation
A service chain is the technological implementation of a developed methodology, including its interfaces with the common gateway(s) The implementation may address the integration of different service chains in complex scenarios. At the end of the implementation phase a service chain is ready to be used in the deployment and operation of a defined scenario, in a stand alone mode or coupled with other service chains participating to a complex scenario.
As part of the implementation there is a service chain test addressing, where applicable, the following macro-functionalities:

- data procurement (e.g. acquisition of EO data in case of monitoring services, etc)
- data processing (e.g. test of the modules dedicated to pre-processing/processing/post-processing and their interfaces)
- Archiving (e.g. check of the interfaces with the repositories, etc)
- Publishing (e.g. test of the services interfaces with the common gateways)

The deliverable associated to this subtask is D2200.1

Services chains operations
According to the G-MOSAIC logic, the services chains operations are made up of 2 phases, corresponding to the scenarios deployment. Depending on each defined scenario the service chain operation may have different duration within the deployment timeframes.
The services chains operation includes the activity of integrate and operate services chains participating to common complex scenarios. The operation of such integrated services chains will be done co-ordinately by the respective service chains developer.
The deliverable associated to this subtask is an internal report contributing to D2100.6

Training
This subtask is aimed at producing the needed training material relative to the service chains, i.e. presentations, manuals, sample data.

Role of participants

With reference to the WP subtask, the responsibilities of this WP are distributed as follows:
INDRA ESPACIO
Responsible for the two service chains. Service provider for service chain #1: nuclear decommissioning - in collaboration with EUSC.

JRC
Liaison with end users in chain #2: nuclear plant monitoring chain. Adaptation and deployment of the common integration platform developed under LIMES (this includes the use of JRC tools in the LIMES platform, e.g., 3D scene change detection). Population of the platform with data and information generated in chain #2.

DLR
Service provider for the volumetric studies (DEM) for nuclear plant monitoring, with contributions to the general stereo data processing of the optical VHR data. Rough estimation of height changes in the nuclear facility from monoscopic images in between the stereoscopic exercises

TPZ
Geocoding and co-registation of HR (optical) and VHR (optical and SAR) images for nuclear plant search and monitoring

TUBAF
Service provider for change detection services in the nuclear plant monitoring.

EUSC
Liaison with the EU Council users in particular SITCEN and EUMS. Validation and testing of the service chain. Value added to all service chains through in situ (EUSC) interpretation. As leader of WP6200 – training activities liaison with training activities. Remark: restrictions on the disseminations of the activities results might apply in case if confidentiality is needed for security purpose

Deliverables

Reference	Name	Brief description	Month of delivery
D2200.1	[Proliferation and Treaties] Service Chain(s) Prototype	Service Chain prototype is realised before each operational phase	T0+09 T0+24
Internal report	*[Proliferation and Treaties] Definition of the Methodology and specification for the Service Chain*	*Internal report contributing to D2100.2*	*T0+06* *T0+21*
Internal report	*[Proliferation and Treaties] Service Chain validation plan*	*Internal report contributing to D2100.3*	*T0+09* *T0+24*
Internal report	*[Proliferation and Treaties] Service Chain Operation report*	*Internal report contributing to D2100.6*	*T0+21* *T0+33*
Internal report	*[Proliferation and Treaties] Demonstrator - Operational Manual*	*Internal report contributing to D2100.5*	*T0+09* *T0+24*

Work package n°	2300	Start date or starting event:		T0+03			
Wok package title:	**Crisis indicators**						
WP leader	JRC						
Activity type	RTD						
Participant ID	JRC	IST	INFOTERRA FRANCE	GISAT	PLUS	Adelphi	Swisspeace

Objectives
Produce robust indicators for crisis cycle characterisation integrating EO core and downstream service outputs. Crisis indicators are input to assessments at the regional and national level. They provide mappings of geospatial processes that are relevant as crisis triggers (e.g. exploitation of natural resources, land degradation, population dynamics), which need to be combined with socio-economic information for impact assessment. Derivatives of crisis indicator maps are input to "hot-spot" characterisation in WP 2500 (illegal activities) and WP 2600 (Extended routes).

Users: DG-RELEX (EU), EUMS (EU), SITCEN (EU), DG-DEVELOPMENT (EU), Ministero Affari Esteri (Unità Crisi) Users: (IT), French Military Intelligence (DRM) SAG (FR)Centro Nacional de Inteligencia (E), Ministere de la Defense (F), Italian MoD (IT), Spanish, MoD (E), Spanish Foreign Affairs Min (E), Aquas de Portugal (P), Ministério dos Negócios Estrangeiros (P),

Description of work
The use of crisis indicators is well established in the humanitarian aid realm. The Commission's Directory General for Humanitarian Aid (DG ECHO) uses the so-called Vulnerability Index (VI) and Crisis Index (CI) to assess the relative risk of disaster impact on vulnerable countries and the actual correspondence to humanitarian crisis criteria, respectively. The main use of the indicators is to identify the priority countries where humanitarian needs are greatest or most neglected. The indices serve as an objective measuring instrument, suited to the core principles ruling the EU's humanitarian aid policy, while ensuring credibility and transparency of that policy.

The VI and CI indices are aggregated from a number of indicators that are collected mostly at macroscopic level (e.g. human development index, population health situation, exposure to natural disasters) and combined with socio-economic data and on-the-spot assessments by local experts. A number of the indicators used bear direct relevance to security assessment contexts, such as the overall socio-economic assessment, and more specifically exposure to conflict and immigration/emigration flows. However, it is felt that such indicators require significant geographical and thematic refinement in order to be useful in the security realm.

In many conflict areas, security issues are closely related to exploitation of natural resources, population pressure in urban, peri-urban and rural areas, ethnical and cultural diversity of the population, scale and impact of natural and man-made disasters, etc. A number of these refined indicators directly benefit from Earth Observation products derived at different scales and integrated with relevant ancillary geospatial and socio-economic information layers.

The purpose of this Work Package is to apply robust methodologies in which EO-based composite crisis indicators are produced for the following crisis indicators:

Service chain 1
Exploitation of natural resources (ENR index)
Description

This index is based on a comparison of the total surface of primary land resources (fresh water, agriculture, forest, mining areas) to economic data on primary industry production. Generation of this index for the region of interest over a multi-year series is expected to yield important indications on unreported production, inputs to environmental degradation indicators and the key processes that lead to depletion of the natural resources (e.g. input to illegal activity assessment).
The ENR index will be generated from a dedicated Land Use/Land Cover classification derived from a

combination of high resolution optical and SAR imagery (to characterize land use classes at 2 epochs) and medium resolution data (to monitor change processes between the epochs) at scale 1:100,000 and 1:250,000. Extensive mosaicking is required to obtain HR optical coverage for both epochs. Selective HR data will be used to characterize fast changes detected in the MR series (e.g. for mining, forest changes). ENR output for distinct primary production sectors (mining, agriculture and forestry) will be compared to socio-economic data to estimate ratios between reported and unreported trade flows.

In the first phase the indicator will be developed using archived data, both for satellite and for social-economic data, the latter mainly coming from the FAST International network. Building on this work, recent EO data and socio-economic data will be collected. Given the difficult but typical situation for a country suffering or emerging from protracted crisis, complementary data sources on NR exploitation beyond existing official reports need to be siphoned to provide a comprehensive picture. This includes the use of the Local Information Network of FAST International for the DRC/Kivu region as well as trade statistics of neighbouring countries, background research on existing trade flows, and official reports of UN agencies. Due to the indirect nature of this data that can be remotely accessed (including interviews via phone if necessary), field research will be necessary as complementary source.

Estimated surface
The service will be developed for the North and South Kivu provinces of the DRC to support WP 2500 (illegal mining), with HR coverage of a 200 by 200 km² (to be specified with user input).

Target timeframe
The service chain will be deploying and operational during a timeframe of two years.

Mapping frequency
Mapping frequency is in the order of 3-5 years for the HR data and monthly for the MR analysis

Delivery timeliness
The timeliness of delivery is not critical, but should be within one month after receiving image updates.

Assessment of EO data needed:

- Type: Optical, NIR, SWIR and SAR (TIR if available);
- Resolution: MR, HR;
- Mode: Level 2 (system corrected) for all VNIR/SWIR/TIR, image and scansar modes for SAR;
- Volume: MR monthly composites for an area of 500 by 500 km^2, covering 2 epochs. HR composites to cover the 200 by 200 km^2, for 2 epochs. Multi-source (e.g. SPOT, LANDSAT, ASTER) mosaicking is expected to be required to create complete coverage;

Service Chain 2
Population pressure (PP index)
Description
Uncontrolled urbanization and rural migration are key causes for internal conflict and poverty-induced immigration. The indicator for population pressure is a mapping of built-up area in the region of interest. Mapping includes the extent of the built-up area together with structural characteristics on the built up area (in urban and peri-urban areas) that allow linkage to population occupancy and economic state (e.g. poor slums, middle class residential). Multi-year comparison of this index allows derivation of urban growth, rural migration patterns and impact assessment of urban infrastructure use.
The PP indicator is based on a statistical sample of urban and rural areas identified in MR and HR based fast change detection algorithms for built-up areas. For the statistical samples, HR and VHR data from 2 epochs are compared (3 or 5 years apart, depending on the change rate detected) for a detailed characterisation of the PP index (including linkage to occupancy figures). PP index maps are analysed against known population statistics.

Estimated surface
The service will be developed for an area of 300 by 300 km² in Senegal (MR series will cover a much larger area centred over the area).

Target timeframe
The service chain will be deploying and operational during a timeframe of two years.

Mapping frequency
Mapping frequency is in the order of 3-5 years for the HR data and monthly for the MR analysis. VHR data coverage is required for limited areas only once.

Delivery timeliness
The timeliness of delivery is not critical, but should be within one month after receiving image updates.

Assessment of EO data needed:
- Type: Optical, NIR and SAR (TIR if available), VHR SAR may be used experimentally;
- Resolution: MR, HR, VHR;
- Mode: Level 2 (system corrected) for all VNIR/SWIR/TIR, image modes for SAR;
- Volume: MR monthly composites for an area of 500 by 500 km^2, covering 2 epochs. HR composites to cover the 300 by 300 km^2, for 2 epochs; Repeated HR/VHR use on sampling basis;

Service chain 3
Land degradation (LD index)
Description
Adverse impact of natural events and human action may lead to long term or permanent loss of land resources. Desertification, deforestation, slash and burn agricultural practices, uncontrolled irrigation, salinisation of soil, erosion and abusive surface mining may all be causes of land degradation. LD index change rates are important indicators to assess pressure levels on diminishing land and water resources, potential causes for rural migration and efficacy of environmental governance.
LD index generation will target known transition zones identified from existing reference maps and rapid land use/land cover mapping based on a mix of HR and MR data. A statistical sample for sensitive land use classes (e.g. irrigated agricultural land, fresh water reservoirs, mixed forest/range land) will be analysed in detail with regularly spaced time series of HR optical and SAR imagery. Land loss rates will be estimated together with their impact on rural migration/depopulation.

Estimated surface
The service will be developed for an area of 300 by 300 km² in Senegal (MR series will cover a much larger area centred over the area).

Target timeframe
The service chain will be deploying and operational during a timeframe of two years.

Mapping frequency
Mapping frequency is in the order of 3-5 years for the HR data and monthly for the MR analysis. VHR data coverage is required for limited areas only once.

Delivery timeliness
The timeliness of delivery is not critical, but should be within one month after receiving image updates.

Assessment of EO data needed:
- Type: Optical, NIR, SWIR and SAR (TIR if available);
- Resolution: MR, HR;
- Mode: Level 2 (system corrected) for all VNIR/SWIR/TIR, image and scansar modes for SAR;
- Volume: MR monthly composites for an area of 500 by 500 km^2, covering 2 epochs. HR composites to cover the 300 by 300 km^2, for 2 epochs; Repeated HR use on sampling basis;

The combined use of the indices is expected to yield important thematic information layers in the overall assessment of the causes and effects of conflict. ENR, PP and LD indices allow integration with information from continental EO products, e.g. for food security, climate change effects to add value for scenario analysis. JRC has access to a number of relevant ancillary data sets (e.g. the African Soil data

base, global DEM) and GMES service outputs (GMFS, MARS-FOOD, global vegetation products) that will be merged with the regional assessments.
Special care is required for the integration of the service outputs with existing or traditional data sources and working methods for early warning and prevention, in particular for socio-economic and political data. The relevant processes for streamlining the collection, processing and delivery of information to become available in appropriate timescales for the different tasks of policy-making need to be understood, in order to appreciate the role of the services in that context.

For service validation, a comprehensive field visit to the targeted areas – in particular Senegal – will be conducted to enhance analytical relevance of G-MOSAIC crisis indicators. The field visits will serve two main purposes, first, to collect collateral field data to improve validity and, second, to liaise with potential field-level end-users to identify concrete data requirements and implement interfaces for continued service input and output exchange (e.g. at EU delegation, embassies, local NGO representations).

Subtasks
Identification of building blocks
The crisis indicators service chain is based on the compilation of existing methodologies that are available with the partners or carried over from previous and ongoing project activities (e.g. GMOSS, LIMES). The integration of socio-economic collateral and ancillary data layers into the indicator analysis requires the adoption of methodologies that are outside the direct scope of EO-based services, and is a novel aspect of the work.

Definition of methodologies and services chains specifications
The identified methodologies require integration into a seamless service chain. Core building blocks, such as rapid mapping services need to be combined with dedicated land use/land cover classification into thematic map production. Special attention needs to be given to integration of the non-EO based data layers. The methodologies have to take into account interoperability aspects related to:

- the integration of basic image processing service chains (geo-coding, radiometric calibration, mosaicking);
- the integration of image classification service chains into the land use/land cover production chain;
- the integration of land use/land cover and ancillary geospatial data layers into ENR, PP and LD index layers;
- the integration of service chain outputs from other relevant GMES services (e.g. GEOLAND, GMFS);
- the integration of the service chains output in a common gateway;
- the interfaces with the context data needed to complement the service chain outputs (socio-economic data, reference updated information)

Once a methodology is defined, it is implemented by setting up a work flow.
The deliverable associated to this subtask is an internal report contributing to D2100.2 and D2100.3

Services chains methodology implementation
A service chain is the technological implementation of a developed methodology, including its interfaces with the common gateway(s). The implementation addresses the integration of different service chains in the production of the ENR, PP and LD crisis indicators. At the end of the implementation phase the crisis indicator service chain is ready to be used in the deployment and operation in a regional/national assessment scenario. While the crisis indicators layers will be produce in a stand alone mode, they allow coupling with other service chains at the analysis stage (e.g. food security maps, socio-economic layers).
As part of the implementation there is a service chain test addressing, where applicable, the following macro-functionalities:

- data procurement (e.g. acquisition of EO data in case of monitoring services, etc)
- data processing (e.g. test of the modules dedicated to pre-processing/processing/post-processing and their interfaces)
- Archiving (e.g. check of the interfaces with the repositories, etc)
- Publishing (e.g. test of the services interfaces with the common gateways)

The deliverable associated to this subtask is D2300.1

Services chains operations
According to the G-MOSAIC logic, the services chains operation is made up of 2 phases, corresponding to the scenarios deployment. The scenarios in the case of WP 2300 are related to the selected regions. Depending on each defined scenario the service chain operation for the ENR index is phased to produce results first for the DRC region (to assist WP 2500) and then for the Senegal area. PP and LD services are aimed at the Senegal area.
The deliverable associated to this subtask is an internal report contributing to D2100.6

Training
This subtask is aimed at producing the needed training material relative to the crisis indicator service chains, i.e. presentations, manuals, sample data.

Role of participants

JRC
Has overall responsibility for WP 2300. It coordinates the work of the partners by harmonizing the common methodology, in particular with regards to geo-statistical sampling approaches and integration of index outputs in socio-economic analysis. A focus will be on the PP index, which requires integration of methods developed at the JRC. JRC will be in charge of the DRC test case. JRC will be responsible for service evaluation with end-users in the Commission.

JRC will contribute to develop synthetic crisis indicators. and will support the design and implementation of the visualization of critical developments on maps

IST
Will contribute to the base land use mapping work (for ENR, LD indices) and in particular to the data integration and interpretation stage. IST experience in impact modelling and analysis in accordance with Harp Nut guidelines is relevant in this context. IST will be in charge of the Senegal test case.

Infoterra France
Contributes with methodologies and expertise in land use and built-up mapping (for ENR, PP and LD indices). In particular vegetation extent and status mapping as input to ENR and LD indices will be addressed, with an emphasis on change detection and change rate mapping. INF will be responsible for service evaluation with end-users (other than those in the Commission).

GISAT
Will contribute to operational methodologies for all three indices. Expertise in land use/land cover, agricultural and forestry mapping will be used to complement other partner's expertise. GIS functionality will be employed for information integration, map generation and quality assessment

PLUS
Will be responsible for the land use/land cover mapping production that is the basis for the indicator mapping service. A particular focus will be on the ENR and LD indices, which require adaptation to the relevant land use classes.

Adelphi
Will be responsible for integration with socio-economic ancillary and collateral data to perform impact and forecasting analysis. ADELPHI's experience in crisis assessment and modelling is highly relevant. Service evaluation for national foreign policy entities will be performed by ADELPHI.

Swisspeace
Swisspeace will provide the archived information gathered through the FAST international network until March 2008. Swisspeace will reactivate its network in the DRC/Kivu region for the first two years of the project and will provide the collected information.

Deliverables			
Reference	Name	Brief description	Month of delivery
D2300.1	[Crisis indicators] Service Chain(s) Prototype	Service Chain prototype is realised before each operational phase	T0+09 T0+24
Internal report	*[Crisis indicators] Definition of the Methodology and specification for the Service Chain*	*Internal report contributing to D2100.2*	*T0+06* *T0+21*
Internal report	*[Crisis indicators] Service Chain validation plan*	*Internal report contributing to D2100.3*	*T0+09* *T0+24*
Internal report	*[Crisis indicators] Service Chain Operation report*	*Internal report contributing to D2100.6*	*T0+21* *T0+33*
Internal report	*[Crisis indicators] Demonstrator - Operational Manual*	*Internal report contributing to D2100.5*	*T0+09* *T0+24*

Work package n°	2400		Start date or starting event:		T0+03			
Wok package title:	**Critical Assets**							
WP leader	GMV							
Activity type	RTD							
Participant ID	GMV	INDRA ESPACIO	UNIBAS	Skysoft	TNO	EUROSENSE	CRPSM	ITD

Objectives

The overall objective of the WP is to develop and run one or more service chains which will provide information within the framework of services cases scenarios set-up in WP 2100

Main objective of the work package is to increase the critical assets security in areas outside Europe by providing specific geo-spatial information for intelligence and early warning purposes.

Activities shall be focussed on the identification of indicators (of threats) for the different critical assets in the different scenario, the monitoring and assessment of such indicator by using, earth observation based techniques, geo-spatial intelligent techniques, correlation of information and events and knowledge handling. The objective is to be able to anticipate and aware of any possible event or action that put in risks the different infrastructures and therefore the citizens. Special focus shall be put on terrorism as has been shown that is one of the main threats and all EU critical assets outside Europe are potential objectives.

Based on past recent events and the current international framework relevant assets to be addressed within the project include:

- Energy related infrastructures: In three of the stages, energy production (oil fields, dams, nuclear and power plants), energy storage areas (oil deposits, close to airports, ports, industrial areas,…), energy transportation (pipelines)
- Infrastructures linked with goods and persons transport. Due to the importance and the impact into the final citizens the critical assets such as airports, harbours are potential objectives for threats and shall be monitored in order to prevent any damage.
- Other infrastructure of special interest of the users defined in the different scenarios in the frame of the project.

Critical assets shall be consider of high priority to be secured as any security issue has both a direct effect on the infrastructure and citizens with the corresponding loose of lives and economic problem but also a cascade effect that can cause the overall security be compromise, reduce the citizens perception of security and also modify the economy a large scale.

Users: DG-RELEX (EU), EUMS (EU), SITCEN (EU), DG-DEVELOPMENT (EU), French Military Intelligence (DRM) SAG (FR)Centro Nacional de Inteligencia (E), Ministere de la Defense (F), Italian MoD (IT), Spanish, MoD (E), German reconnaissance institutions.

Description of work

Within the WP different service chains will be deployed and delivered to the different users. The service chains shall not be independent and shall bring their own capabilities to contribute to the critical assets protection scenario.

Two different service chains will be developed in the frame of critical assets protection. A first one dealing with the monitoring of selected assets around Europe to anticipate any issue on citizens security, infrastructure damage and consequences due to any illegal action against the assets and a second one to identify possible causes leading to assets compromising: i.e. terrorism, economical objectives sabotage,…

Service chain 1

Critical assets monitoring

Description

Proposed service chain will provide GEO-spatial intelligence products mainly based on Earth Observation derived information in order to monitor EU critical assets outside of Europe. Either "point" infrastructures (dams, plants, sensitive buildings e.g. hospitals, etc) and "linear ones (pipelines, road networks, railways, etc) will be target features for the identified services chains. The information to be provided are based on

the outputs of the service chain elements:

- analysis of availability and suitability of EO data sources: multi-mission assessment of EO data for specific scenario objectives;
- high resolution maps 2D and 3D of selected infrastructures;
- fusion of HR optical data + HR SAR data;
- HR 3D change detection for optical and SAR based information;
- low spatial resolution/high temporal resolution analysis of security indicators (e.g. thermal information, plumbs,…);
- assessment of infrastructure activities over night;
- geo-spatial reasoning: integration of heterogeneous information, events and information correlation, final products delivery.

Different assets will be mapped:

- Oil camps: 2 in Asia (e.g. Iran, Iraq), 1 in Africa (e.g. Angola)
- Roads 1 Africa (e.g. Angola)
- Pipelines: 2 Asia (e.g. Iran, Iraq)
- Energy storage points: 1 in Asia (e.g. Emirates), 1 in Africa (e.g. Angola)
- Airports: 1 in Africa (e.g. El Cairo), 3 in Asia (e.g. Indonesia, e.g. Emirates, e.g. Malaysia)
- Dams: 1 dam in Africa (e.g. Mozambique, Zimbabwe), 1 dam in Asia (e.g. China).
- Harbors 1 Africa (e.g. Tanger or Cape Verde), 1 Asia (e.g. Singapore*)*

Estimated surface
The area to be covered depends on the specific building block of the service chain; high resolution maps will be typically 1:5.000-1:10.000 and around 40sqKm-100sqKm. For low resolution analysis the scale is around 1:400.000 with an average coverage of 1.000.000sqKm. For the low resolution maps at least 6 sites will be analysed at same time.
Target timeframe
The service will be operational during the project lifetime two "service delivery" phases corresponding to about two years in total.
Feedback from the users will feedback the system and additional data sources from user available information and third parties will be included along the project while becoming available.
Mapping frequency
Low resolution GEO based data will be analysed al least daily, in order to have a continuous overall monitoring of the different areas and anticipate any possible problem.
High resolution optical and SAR imagery will be analysed at least each two months but also triggered either by intelligence information coming from the users or indicators coming from lower resolution satellites of third party trusted information (3 times per/year).
Delivery timeliness
The GEO based with high revisit rates will be made available within 3 hours after acquisition. The data will be received processed and integrated in information systems within the first three hours.
High resolution optical and SAR data acquired on regular acquisitions will be delivered within two days after the acquisition of the image. This includes the reception of the data, the processing, information correlation, integration and delivery via web and other agreed media.
For the high resolution data requested on demand on the basis on the user sources information or based on the indicators provided by high resolution satellite analysis, it is expected the geo-information based products to be delivered after 24 hours of acquisition.
Assessment of EO data needed
Optical VHR satellites

- Panchromatic + Multispectral (Visible + NIR + MIR when available)

Based on the frequency of observation of the described areas the following volume is foreseen: 4 sites x 5 images/year x 2 years: around 40 frames.

SAR VHR satellites

- HR 1m X-band images, full polarized

Based on the frequency of observation of the described areas the following volume is foreseen: 4 sites x 5 images/year x 2 years, around 40 frames.
SAR Medium resolution satellites

- 10-15m resolution in C-band full polarization.

Based on the frequency of observation of the described areas the following volume is foreseen: 3 sites x 15 images/year x 2 years, around 90 frames.
Low Resolution multi-spectral data

- Low resolution GEO based data: 3km spatial resolution: VIS+NIR+MIR+TIR
- High sensitivity satellites (e.g. OLS sensor on DMSP): 500m spatial resolution: VIS+NIR+MIR+TIR

740 frames/year x 2 years = 1480 frames.

Service chain 2
Critical assets events assessment
The aim of such service chain is to be able to analyse the critical infrastructure after a security breach is detected, either by other G-MOSAIC services chains or by other information coming into the system. The objective of such service chain is provide additional information to establish possible links with other security indicators and try to trace the source of the threat: i.e. terrorism, robbery,… this service chain shall receive information from the monitoring chain and perform some specific analysis to trace possible threats causing the problem. The information provided shall be used by the monitoring chain to prevent the further security issues. The service chain will look for indicators in areas close to the assets, in locations identified by intelligence and will look for correlation between events to detect behaviour patterns:

- analysis of availability and suitability of EO data sources: multi-mission assessment of EO data for specific scenario objectives;
- land classification;
- low spatial resolution/high temporal resolution analysis of security indicators Build of information layers others than EO based: integration of: social and geopolitical information, intelligence information;
- change detection;
- events and information correlation;
- DEM generation;
- geo-spatial reasoning;
- production of derived parameters and indicators and ingestion in the monitoring chain.

Estimated surface
The area to be covered depends on the specific service chain building block.
For low resolution analysis 1:400000 with and area of around:1.000.000sqm.

Target timeframe
The service will be operational during the project lifetime two "service delivery" phases corresponding to about two years
Feedback from the users will feedback the system and additional data sources from user available information and third parties will be included along the project while becoming available.

Mapping frequency
The service chain will be triggered either by intelligence information coming from the users or from the monitoring chain. It is expected to be triggered 3 times/year.
Delivery timeliness
Low resolution data will be delivered, 3 hours after acquisition.
Assessment of EO data needed
SAR Medium resolution satellites

- 10-15m resolution in C-band full polarization.

4 day x 5 events/year x 2 years = 40 frames.
Low Resolution multispectral data

- Low resolution GEO based data: 3km spatial resolution: VIS+NIR+MIR+TIR

The average volume of data foreseen is: 30xday x 5 events/year x 2 years = 300 frames.

Subtasks

Identification of building blocks
The building blocks are the elements used to implement the service chains through proper methodologies. G-MOSAIC will use already existing building block derived by previously or ongoing projects and initiatives, both GMES and non-GMES, addressing topics of interest for security purposes. WP4200 will generate a document, in the early stages of the project, listing all the available building blocks. The constituent elements for each service chain will be selected among these.

Definition of methodologies and services chains specifications
A methodology describes the process through which existing building blocks are combined in order to provide, as a result, information supporting thematic tasks. The methodologies are presented by flow diagrams which define the relation between the building blocks. The methodologies have to take into account interoperability aspects related to:

- the integration of different service chains in complex scenarios
- the integration of the service chains output in a common gateway
- the interfaces with the context data needed to complement the service chain outputs (socio-economic data, reference updated information)

Eventually, the methodology has to take into account the relation with its outputs with the scenario dossier.
Once a methodology is defined, it is implemented by setting up a work flow.
The deliverable associated to this subtask is an internal report contributing to D2100.2 and D2100.3

Services chains methodology implementation
A service chain is the technological implementation of a developed methodology, including its interfaces with the common gateway(s) The implementation may address the integration of different service chains in complex scenarios. At the end of the implementation phase a service chain is ready to be used in the deployment and operation of a defined scenario, in a stand alone mode or coupled with other service chains participating to a complex scenario.
As part of the implementation there is a service chain test addressing, where applicable, the following macro-functionalities:

- data procurement (e.g. acquisition of EO data in case of monitoring services, etc)
- data processing (e.g. test of the modules dedicated to pre-processing/processing/post-processing and their interfaces)
- Archiving (e.g. check of the interfaces with the repositories, etc)
- Publishing (e.g. test of the services interfaces with the common gateways)

The deliverable associated to this subtask is D2400.1

Services chains operations
According to the G-MOSAIC logic, the services chains operations are made up of 2 phases, corresponding to the scenarios deployment. Depending on each defined scenario the service chain operation may have different duration within the deployment timeframes.
The services chains operation includes the activity of integrate and operate services chains participating to common complex scenarios. The operation of such integrated services chains will be done co-ordinately by the respective service chains developer.
The deliverable associated to this subtask is an internal report contributing to D2100.6

Training
This subtask is aimed at producing the needed training material relative to the service chains, i.e.

presentations, manuals, sample data

Role of participants

GMV
For both the services chains GMV will be service chain coordination and service provider. GMV will perform the complex service integration. Integration in-situ, additional and specific. High resolution SAR and optical satellites change detection in 3D. EO data sources availability, data fusion. DEMs generation. Spatial reasoning (the goal is to move from GIS technology as "just" a repository of geo-localized information and data, to a true capacity of analysis of those data for the design of a strategy to face a particular situation, taking into the different dimensions of the problem: population, vital resources, transport networks, housing. Relying on advances in information modelling and processing capability)

UNIBAS
Low resolution imagery analysis for service chain #1.

CRPSM
Service chain #1: High sensitivity satellites data analysis (over night)
Service chain #2: Low resolution data analysis.

INDRA ESPACIO
For service chain #1 INDRA ESPACIO will perform 3D mapping of critical assets and contribution to critical assets database.

EUROSENSE
Service chain #1: 2D mapping of critical assets and contribution to critical assets database.

Infoterra GmbH (ITD)
Service chain #1: 3D mapping and change detection of critical assets.

Skysoft
Service chain #1:. Change detection in 3D.
Service chain #2: Land classification, indicators data base. Information integration and correlation. Data fusion. DEMs generation.

TNO
Service chain #1: medium and High Resolution SAR change detection of activities on, and in the vicinity of, critical infrastructures and assets (e.g. third party interference). Assistance with the analysis and fusion of results in combination with geospatial information from other sources (optical, multi-spectral, LiDAR, GIS)

Deliverables

Reference	Name	Brief description	Month of delivery
D2400.1	[Critical Assets] Service Chain(s) Prototype	Service Chain prototype is realised before each operational phase	T0+09 T0+24
Internal report	*[Critical Assets] Definition of the Methodology and specification for the Service Chain*	*Internal report contributing to D2100.2*	*T0+06* *T0+21*
Internal report	*[Critical Assets] Service Chain validation plan*	*Internal report contributing to D2100.3*	*T0+09* *T0+24*
Internal report	*[Critical Assets] Service Chain Operation report*	*Internal report contributing to D2100.6*	*T0+21* *T0+33*
Internal report	*[Critical Assets] Demonstrator - Operational Manual*	*Internal report contributing to D2100.5*	*T0+09* *T0+24*

Work package n°	2500	Start date or starting event:		T0+03			
Wok package title:	**Illegal activities**						
WP leader	DLR						
Activity type	RTD						
Participant ID	DLR	INDRA ESPACIO	JRC	TPZ	TNO	GISAT	Infoterra UK

Objectives
The overall objective of the WP2500 is to develop and run three chains, which will provide information on illegal activities related to natural resources in conflict within the framework of services cases scenarios set-up in WP 2100.
The present thematic WP is focussed on natural resources and their role in regional conflicts. The illicit trade in profitable resources such as diamonds, timber and others often feeds into trans-national criminal activities, fuelling corruption and reducing state revenues. Uncontrolled or illicit exploitation of natural resources (forestry, crops) is accompanied by highly unsustainable practices leading to massive environmental destruction and livelihood insecurities. Illegal mining is also a highly unsustainable activity, e.g. using mercury or cyanide for gold extraction. Recent armed conflicts revealed the importance of natural resources for financing violent conflict by non-state armed groups.
Activities will include detection/mapping as well as monitoring and will be focused on the following topics:

- illegal mining (e.g. gold, copper, coltan, diamonds);
- illegal timber extraction (logging);
- illicit crops (drugs).

Remote sensing data used for the analysis will not be sensitive data (no security restrictions apply).

Users: DG-RELEX (EU), EUMS (EU), SITCEN (EU), DG-DEVELOPMENT (EU), BKA (D), Global Witness (GB),

Description of work

Service chain 1
Illegal mining

Description
The DRC for decades has experienced entrenched corruption, looting and mismanagement within the natural resources sector resulting in the failure for the country to develop despite the country's rich supply of resources, including gold, tin ore, copper, diamonds and timber. The country is now one of the poorest in the world according to the UN. In addition, the scramble for the mineral and timber reserves was a significant contribution to the brutal armed conflict stretching over 10 years and resulting in the deaths of over 4 million people. The Congolese army and various armed groups from DRC and neighbouring countries all plundered the natural resources and used profits to perpetuate the conflict.
The service chain will contribute to provide a comprehensive picture of mining activities in DRC answering questions such as:

- Where are the locations of active sites?
- Who is involved in the mining operations (industrial companies or artisanal miners)?
- What activities are performed and what is the duration of activity and active transportation routes?

The service chain will use medium to high resolution imagery from both optical and radar sensors for the detection of mining sites in certain mining areas. Subsequently a monitoring of selected mining sites will be set up on a regular basis for monitoring and identification of new activities. This service chain will rely for optical data on methods developed for exploration geology based on the spectral response of minerals and visual interpretation. In addition radar analysis will be included in order to be able to respond to heavy cloud cover
Once specific mining sites were identified (or were provided from other information sources) they are analysed using VHR optical and radar data in order to provide detailed information on the activities carried out (mined area, excavation rates, transport routes, …) Possibly stereo pairs of VHR optical data and InSAR. could be used for estimation of mine tailings volume.

Estimated surface
The service will be developed for the North and/or South Kivu provinces of the DRC, where in the mining districts high to medium resolution monitoring is performed for an area of approx. 100 by 100 km² (to be specified with user input). For some specific areas VHR data is analysed with an area of approx. 200 km².

Target timeframe
The service chain will be deploying and operational during a timeframe of two years.

Mapping frequency
Mapping frequency is in the order of six month for the HR data and between one and three month for the VHR analysis once specific areas of interest were identified

Delivery timeliness
The timeliness of delivery should be within one week after data acquisition, but it is probably not a key issue.

Assessment of EO data needed
- type: Optical, SAR;
- resolution: HR, VHR, (MR);
- mode: mainly pre-defined, possibly very limited 'on demand' data for specific user needs;
- volume: for large area analysis (HR, MR) 1-2 frames for each radar/optic per analysis cycles, for detailed analysis (VHR) 1-2 frames per area.

Service chain 2
Illegal Timber Logging

Description
As described above, the situation in the DRC favours not only the illegal exploitation of minerals, but also of timber. Despite several moratoria in place, illegal logging is ongoing in many areas. The service chain will contribute to provide a comprehensive picture of logging activities in specific districts in the DRC answering questions such as:
- Where are changes in canopy cover/structure?
- Can indicators for logging be detected (recent logging, slash-and-burn activities, changes in road networks in forest estates)?

The service chain should be able to estimate losses in forest cover in hectares through logging, slash-and-burn practices and road network development.
The service chain will use medium to high resolution imagery from optical and radar sensors for the detection of logging activities in certain forest estates that are of interest for the user and a monitoring of these areas will be set up on a biannual (Sept-Oct, Feb-Mar) basis for identification of new activities.
The service chain will be built using experiences gathered through tropical rainforest research projects such as BIOTA (http://www.biota.org) and on methods for general change detection. For the service chain spectral information from optical sensors will be combined with radar data using L-Band and the coming VHR X-band sensors, which allow receiving of images also in cloudy conditions.

Estimated surface
The service will be developed for one of the following districts in DRC (to be modified according to user needs):
- Bandundu (Lake Télé – Lake Tumba Landscape / Salonga–Lukenie–Sankura Landscape)
- Equateur Provinces (Maringa-Lopori-Wamba Landscape, Bumba/Lisala Districts)
- Orientale Province

Target timeframe
The service chain will be deploying and operational during a timeframe of two years.

Mapping frequency
Mapping frequency is biannual in the dry season (Feb-Mar, Oct-Nov)

Delivery timeliness
The timeliness of delivery should be within one week after data acquisition, but it is probably not a key issue.

Assessment of EO data needed
- type: Optical, SAR;
- resolution: HR, VHR, (MR);
- mode: mainly pre-defined, possibly very limited 'on demand' data for specific user needs;
- volume : for large area analysis (HR, MR) 1-2 frames for each radar/optic per analysis cycles, for detailed analysis (VHR) 1-2 frames per area.

Service chain 3
Illicit Crops

Description
Drug abuse is a well known worldwide phenomenon with UN Member States committed to reduce significantly both the supply of and demand for drugs by 2008, as expressed in the Political Declaration on the Guiding Principles of Drug Demand Reduction. A diversity of projects at different levels tend to reduce illicit crop fields trying to move the farmers production to other profitable crops or alternative sources of income.
In this sense, monitoring specific user-defined production areas affected by these policies and projects can be a useful tool for decision makers.
The service chain will contribute to answer among others questions such as:
- Are the EU projects for illegal crop limit cultivation effective?
- How are moving trends in these areas?

The service chain will use HR to VHR images from optical sensors, from 1 to 10 meters using visible, near infrared bands and panchromatic images. The method will rely primarily on visual interpretation in a first stage on 1m resolution images for feature classification and 10 meters images for inventory and monitoring. It could be possible, if the area of interest would be finally North Africa, to make some field work to help cannabis feature classification.

Estimated surface
The service is initially proposed in the North Africa covering an area of 3600 square kilometres.

Target timeframe
The service chain will be deploying and operational during a timeframe of two years.

Mapping frequency
Mapping frequency is twice a year. In April (before harvest) and October.

Delivery timeliness
The timeliness of delivery will be 1 month after data acquisition

Assessment of EO data needed
- type: Optical (VIS, NIS, PAN) ;
- resolution: VHR, HR;
- mode: pre-defined;
- volume: for large area analysis (HR 10 meters, 3600 km^2). For detailed analysis (VHR 1 meter, 50 km^2).

Subtasks
Identification of building blocks
The building blocks are the elements used to implement the service chains through proper methodologies. G-MOSAIC will use already existing building block derived by previously or ongoing projects and initiatives, both GMES and non-GMES, addressing topics of interest for security purposes. WP4200 will generate a document, in the early stages of the project, listing all the available building blocks. The constituent

elements for each service chain will be selected among these.

Definition of methodologies and services chains specifications
A methodology describes the process through which existing building blocks are combined in order to provide, as a result, information supporting thematic tasks. The methodologies are presented by flow diagrams which define the relation between the building blocks. The methodologies have to take into account interoperability aspects related to:

- the integration of different service chains in complex scenarios
- the integration of the service chains output in a common gateway
- the interfaces with the context data needed to complement the service chain outputs (socio-economic data, reference updated information)

Eventually, the methodology has to take into account the relation with its outputs with the scenario dossier.
Once a methodology is defined, it is implemented by setting up a work flow.
The deliverable associated to this subtask is an internal report contributing to D2100.2 and D2100.3

Services chains methodology implementation
A service chain is the technological implementation of a developed methodology, including its interfaces with the common gateway(s) The implementation may address the integration of different service chains in complex scenarios. At the end of the implementation phase a service chain is ready to be used in the deployment and operation of a defined scenario, in a stand alone mode or coupled with other service chains participating to a complex scenario.
As part of the implementation there is a service chain test addressing, where applicable, the following macro-functionalities:

- data procurement (e.g. acquisition of EO data in case of monitoring services, etc)
- data processing (e.g. test of the modules dedicated to pre-processing/processing/post-processing and their interfaces)
- Archiving (e.g. check of the interfaces with the repositories, etc)
- Publishing (e.g. test of the services interfaces with the common gateways)

The deliverable associated to this subtask is D2500.1

Services chains operations
According to the G-MOSAIC logic, the services chains operations are made up of 2 phases, corresponding to the scenarios deployment. Depending on each defined scenario the service chain operation may have different duration within the deployment timeframes.
The services chains operation includes the activity of integrate and operate services chains participating to common complex scenarios. The operation of such integrated services chains will be done co-ordinately by the respective service chains developer.
The deliverable associated to this subtask is an internal report contributing to D2100.6

Training
This subtask is aimed at producing the needed training material relative to the service chains, i.e. presentations, manuals, sample data.

Role of participants
The responsibilities of this WP are distributed as follows:
DLR
DLR will be responsible for the overall coordination of activities carried out in this WP.
One main focus of the development within G-MOSAIC will be to qualify and combine already existing methods (building blocks) to achieve user-relevant information of illegal activities, which will provide evidence for decision-makers.
The main topics of the chains, DLR will provide and contribute are:

- service chain provider;
- pre-processing and analysis of optical data (MR/HR, VHR) for identification and monitoring of illegal mining activities;
- pre-processing and analysis of optical and radar data (MR/HR, VHR) for identification and monitoring of illegal logging activities;

- contact to Global Witness.

DLR is responsible for the deliverable within the WP, D2500.1 and to collect contribution to for WP2100 deliverables

JRC

- JRC will assist in the methodological development and the quality assessment of the service outputs. This requires combination with collateral and ancillary data sets to scale the EO-based observations to trade flows deriving from the illegal activities. In particular, JRC will contribute to:
- provide inputs from WP 2200 (Crisis Indicators) to determine the location and size of the areas to be investigated;
- statistical methodology to assess the statistical representation of the selected areas for the characterisation of the overall illegal process;
- assist partners in general processing and image classification solutions based on JRC experience in the various contexts (esp. illicit crops, mining)
- assemble collateral and ancillary data sets to scale the service outputs to estimate the monetary value of the resource extraction in the local settings;
- perform a sensitivity analysis of the assembled data layers to understand error propagation, robustness of the methodology and its applicability to the particular context;
- liaison with EU delegations in the countries of study to obtain relevant information inputs and to demonstrate the service products for internal use;
- JRC will contribute to the relevant part of the deliverables.

TPZ

TPZ will be responsible for the following activities:

- pre-processing and analysis of SAR data (HR, VHR) for identification and monitoring of illegal mining activities;
- contribution to fusion of geo-spatial information derived from optical and SAR missions for illegal mining activities;
- contribution to illegal mining service chain methodology definition and service chain implementation;

TPZ will contribute to the relevant part of the deliverables

INDRA ESPACIO

INDRA ESPACIO will be responsible for the whole service case of illicit crops and will produce the corresponding part of the deliverables D2500.1 thru D2500.12.

- Service chain provider;
- pre-processing and analysis of optical data (HR and VHR) for identification and monitoring illegal crops in the selected area;
- contact with relevant users;
- technical coordination with DLR and JRC.

TNO

TNO will assist in the development and running of the three service chains with MR/HR/VHR SAR change detection technology providing information on illegal activities. It will also assist in the integration of the technology in the service chains, and the fusion of its outputs with geospatial information from other sources (EO and context).

The SAR change detection technology and information fusion will include:

- pre-processing of SAR images (automatic co-registration of geocoded images to reduce false alarms, speckle suppression);

- detection of changes and theoretical background;
- reduction of false detections (based on image features and context);
- GIS and geospatial information processing;
- pre-processing of SAR images will not include geocoding or orthorectification;
- TNO will contribute to the relevant part of the deliverables.

GISAT
GISAT will contribute to the feature classification of the illicit crops in the service chain. The main focus will be put on the evaluation and combination of existing methodologies of crop interpretation and classification in the task. This includes the following topics:

- pre-processing of the multi-temporal optical HR/VHR data;
- analysis of the spectral signatures;
- design and application of classification model for identification of illicit crops;
- accuracy assessment.

GISAT will contribute to the relevant part of the deliverables.

Infoterra UK (Infoterra UK)
Infoterra UK will be carrying out processing and analysis of MR and HR optical data to detect illegal logging activity within selected provinces of the Democratic Republic of Congo. It is envisaged that a semi automated processing chain will be developed and utilised where possible. This process will allow the receipt, ortho-rectification and comparison with previously collected data to highlight areas of activity. This will be achieved through change detection analysis and vegetation classification methods. Once areas of change have been identified and classified as legal or illegal, a quantitative assessment of the activity will be carried out to indicate the size and extent of the logging. This activity will be carried out in parallel with DLR's analysis of Radar imagery.
The analysis will be performed biannually over 2 years with imagery collects occurring in the dry season (Feb/Mar and Oct/Nov). The results of the analysis will be output and integrated with other assessment techniques to check for correlations.
INFOTERRA UK will contribute to the relevant part of the deliverables

Deliverables

Reference	Name	Brief description	Month of delivery
D2500.1	[Illegal activities]] Service Chain(s) Prototype	Service Chain prototype is realised before each operational phase	T0+09 T0+24
Internal report	*[Illegal activities] Definition of the Methodology and specification for the Service Chain*	*Internal report contributing to D2100.2*	*T0+06* *T0+21*
Internal report	*[Illegal activities] Service Chain validation plan*	*Internal report contributing to D2100.3*	*T0+09* *T0+24*
Internal report	*[Illegal activities] Service Chain Operation report*	*Internal report contributing to D2100.6*	*T0+21* *T0+33*
Internal report	*[Illegal activities] Demonstrator - Operational Manual*	*Internal report contributing to D2100.5*	*T0+09* *T0+24*

Work package n°	2600	Start date or starting event:		T0+03		
Wok package title:	**Routes and Borders**					
WP leader	Infoterra GmbH					
Activity type	RTD					
Participant ID	ITD	SRC	EUROSENSE	CRPSM	SCOR	TPZ

Objectives

The overall objective of WP 2600 is to develop, test and validate service chains which will provide information within the framework of services cases scenarios set-up in WP 2100

The present thematic WP 2600 is focused on the monitoring of the migratory routes extending from politically unstable countries to third countries borders. The conditions for mass population movements and forced migration away from environmentally degraded regions can be caused by internal conflicts, poverty, human rights abuse and famine and all can create pressures on neighbouring countries. Preventing such extended migratory routes can be done by monitoring the political or environmental unstable regions in order to spot mass population movements and by observing border crossing in areas easily accessible.

Activities will include detection/mapping, monitoring, early warning triggered by change detection, and will be focused on the following topics:

- Border crossing and related infrastructure along the borders (e.g. identification of "narrow throats" of migration corridors, surveillance of border crossing activities, a suspicious/clandestine infrastructure at the vicinity of the borders, convoys of vehicles, etc.)
- Long range migration routes and temporary settlements along the routes (e.g. gathering spots at the migration origin locations, convoys of vehicles, clandestine airports, maritime ports as well as shelters, camps and oases used as a temporary settlements on the migration routes, suspicious side roads which are rarely frequented by regular traffic or the statistical overview of the volume and the direction of the travellers)

Some already identified service chains can be taken as examples to illustrate the geopolitical context of the "extended routes" work package, namely:

- (Military) activities and border-crossing and related infrastructure along the borders
- Long range migration routes and temporary settlements along the routes

Users: DG-RELEX (EU), French Military Intelligence (DRM) SAG (FR) Centro Nacional de Inteligencia (E), German reconnaissance institutions.

Description of work

Within the WP different service chains will be consolidated, tested and validated. Respectively, the services will be deployed and delivered to the different users under pre-operational conditions. These services will contribute to the "extended routes" monitoring scenarios. The interoperable services will address interdependence of events and indicators by providing correlation layers integrating the information coming from the available sources: EO acquired data, user intelligence, ancillary data, historical information, geopolitical databases.

The services as described below have been identified. Adequate service chains will be developed, tested and validated in the frame of "extended routes" monitoring, as stated above in the objectives.

Below, the main features of each of these services are described.

Service chain 1

Monitoring of (military) activities and border-crossing and related infrastructure along the borders

The EO-based solutions are aimed to improve existing surveillance services and support situation awareness in the border area and in the zones adjacent to the border line (e.g. area security sensitivity assessment, identification of the routes used by terrorists and smugglers, potential shelters, attractiveness/repulsiveness of particular "hot spot" locations etc.) They will provide significant intelligence support in effect enhancing the border control management, more effective engagement of the forces in the field as well as overall performance of the border control mechanisms.

The analysis of intelligence data should result in a number of indices/parameters that will later be used to determine the best sites for EO monitoring:

- The trafficking index that measures each country's socio-economic traits and their impact on specific origin, trans-shipment and destination locations used by the extremist insurgents and drug

smugglers

- The border permeability index, including higher resolution images to describe local scale features on and in the vicinity of the border.
- The attractiveness of the routes estimated on the basis of several factors, such as the distance between the origin and the destination locations in both countries, the available transportation infrastructure (roads, rivers, etc.), the availability of food and water supplies as well as available shelters on the way, the number of crossed borders and the difficulty with passing them unnoticed.

These data will be used to choose the several routes of most probable traffic that will be periodically monitored from satellites to assess the amount of traffic along them. Several "hot spot" locations will be chosen to be monitored more often.

Methodology
The service will build on the use of HR to VHR images from optical sensors, from < 1 to 10 meters using visible, near infrared bands and panchromatic images. The service production will rely primarily on visual interpretation in a first stage on < 1m resolution images for feature classification and 1 to 10 meters images for inventory and monitoring.

Coverage
Worldwide frontier monitoring with a corridor of approximately +/- 50 km along the frontiers. Within the project, focus will be on dedicated test sites in Africa, Eastern Europe and/or Asia.

Target timeframe
The service deployment will start after an initial 9-month phase of service definition and development.
The service will be run pre-operationally over a duration of 12 months followed by a period of service appraisal and feedback gathering in view of improvements for the second pre-operational stage.

Mapping frequency
Regular monitoring according to user requirements (e.g. quarterly)
"Hot spot" locations will be monitored more often, (e.g. weekly).
Within the project, a pre-operational monitoring will be performed only.

Delivery timeliness
Near-real-time delivery of services is envisaged – to be consolidated during the project

Assessment of EO data needed

- Type: Optical HR/VHR satellites
  - Mode: systematic, monitoring twice per year of pre-operations
  - Resolution: HR or VHR Panchromatic
  - Volume:
    . 8 HR/VHR images per year for monitoring of two 100 km border zones (image size : 60 x 60 km)
- Type: SAR VHR Full polarized, e.g. TerraSAR-X, Cosmo-Skymed
  - Mode: on demand for occasional monitoring of hot spots
  - Resolution: 1 m GSD or better
  - Volume: 10 images per year in Spotlight mode for occasional monitoring of a 100 Km border zone (based on the hypothesis that each border zone is monitored at least once a year with an image size being 10 x 10 km)

Note: The number of required images can be optimised if target areas are selected consistently with other service chains.

Service chain 2
Long range migration routes and temporary settlements along the routes
Description

Migrations from Africa (and Asia) pose a severe problem to EU and its Member States. The uncontrolled flow of migrants that reaches Europe results in illegal employment, growing amount of impoverished ethnic ghettos in large European cities, but also in the continuous loss of active and relatively well educated part of African (and Asian) population. The EC as well as the individual MS have long been struggling to prevent this process. The technical surveillance infrastructure based on the state of art technology (radars and thermo-vision devices) has significantly improved borders (also costal borders) permeability, especially in the southern Europe, which is traditionally targeted by illegal migrants from the African region.
Several attempts have been undertaken in Europe in the past in order to support monitoring and to prevent the illegal flow of migrants with the use of EO techniques. For instance, JRC and CRPSM have introduced a border permeability concept and applied it to several African countries. There was also an attempt to detect camps of migrants by observing fires by IR satellite sensors
The EO-based solutions will involve comprehensive monitoring of the migration origin and destinations countries, migration routes as well as the magnitudes and the character of the population movements (refugees, terrorist or militia movements, or activities involving smuggling military significant payloads, cargos or weaponry). In effect, the service development will serve as an early-warning mechanism in order to anticipate and monitor destabilizing mass population movements, migrations or relocations within Africa (and Asia) and prevent their negative impact on illegal immigration patterns to European countries.
The analysis of intelligence data should result in a number of indices/parameters that will later be used to determine the best sites for EO monitoring:

- The migration index that measures each country attractiveness/repulsiveness as an exit or a destination country for migrating persons. This index will be based on the analysis of socio-economical and political situation in the country of question.
- The border permeability index that will follow from the method developed by JRC/CRPSM but will be improved by using higher resolution images to include local scale features on and near the border.
- The attractiveness of migration routes estimated on the basis of several factors, such as the distance between the origin and the destination country, the situation in the transit countries, the available transportation infrastructure (roads, rivers, etc.), the availability of food and water supplies as well as available shelters on the way, the number of crossed borders and the difficulty with passing them unnoticed.
- The urban development index measuring the effects of the mass population movements on the metropolitan areas in the identified destination countries (illicit settlements, slams and ethnic ghettos expansion, etc.)

This data will be used to choose the several routes of most probable traffic that will be periodically monitored from satellites to assess the amount of traffic along them. Several "hot spot" locations will be chosen to be monitored more often.

Estimated surface
Final test sites will be defined with the users. Probably test sites in the Congo region and Chad region.

Target timeframe
The service deployment will start after an initial 9-month phase of service definition and development.
The service will be run pre-operationally over a duration of 12 months followed by a period of service appraisal and feedback gathering in view of improvements for the second pre-operational stage.

Mapping frequency
Regular monitoring according to user requirements.
It can be envisaged that once identified, "Hot spot" locations will be subject to more frequent monitoring
Within the project, service delivery will be limited to test cases only.

Delivery timeliness
Service delivery planned within less than one week from acquisition.
For "Hot Spots" monitoring, the latency might be reduced to achieve near-real-time capability – to be consolidated in the project.
For "Hot Spots" monitoring, the latency shall be reduced to 24 hours.

Assessment of EO data needed
In operational stage, large areas of e.g. Africa will be eventually covered (2 times 1 M km^2). We take the hypothesis of 2.5% (50,000 km^2) to be covered with fresh images (the rest of the area being mapped with images from archives) – to be consolidated during service consolidation phase.
Within the project, it is envisaged to cover only a subset of the area.

- Type: Optical HR Multispectral
  Mode: systematic, 2 times per year on a selected target area of 50 000 km²
  Resolution: HR Multispectral (10 m GSD)
  Volume: 14 HR images per year for monitoring of a 50 000 km^2 area (image size: 60 x 60 km)
- Type: Optical VHR Panchromatic
  Mode: systematic, 2 times per year on a selected target area of 50 000 km²
  Resolution: VHR Panchromatic (1 m GSD or better)
  Volume: 14 VHR images per year for monitoring of a 50 000 km^2 area
- Type: SAR VHR Full polarized, e.g. TerraSAR-X, Cosmo-Skymed
  Mode: systematic: once per year on the selected target area of 50 000 km² (image size: 60 x 60 km)
  Resolution: 3 m GSD or better
  Volume: 17 SAR HR images per year per year for monitoring of a 50 000 km2 area (image size: 30 km across track x 100 km along track).

Note: The number of required images can be optimised if target areas are selected consistently with other service chains.

Subtasks
Identification of building blocks
The building blocks are the elements used to implement the service chains through proper methodologies. G-MOSAIC will use already existing building block derived by previously or ongoing projects and initiatives, both GMES and non-GMES, addressing topics of interest for security purposes. WP4200 will generate a document, in the early stages of the project, listing all the available building blocks. The constituent elements for each service chain will be selected among these.

Definition of methodologies and services chains specifications
A methodology describes the process through which existing building blocks are combined in order to provide, as a result, information supporting thematic tasks. The methodologies are presented by flow diagrams which define the relation between the building blocks. The methodologies have to take into account interoperability aspects related to:

- the integration of different service chains in complex scenarios
- the integration of the service chains output in a common gateway
- the interfaces with the context data needed to complement the service chain outputs (socio-economic data, reference updated information)

Eventually, the methodology has to take into account the relation with its outputs with the scenario dossier.
Once a methodology is defined, it is implemented by setting up a work flow.
The deliverable associated to this subtask is an internal report contributing to D2100.2 and D2100.3

Services chains methodology implementation
A service chain is the technological implementation of a developed methodology, including its interfaces with the common gateway(s) The implementation may address the integration of different service chains in complex scenarios. At the end of the implementation phase a service chain is ready to be used in the deployment and operation of a defined scenario, in a stand alone mode or coupled with other service chains participating to a complex scenario.
As part of the implementation there is a service chain test addressing, where applicable, the following macro-functionalities:

- data procurement (e.g. acquisition of EO data in case of monitoring services, etc)
- data processing (e.g. test of the modules dedicated to pre-processing/processing/post-processing and their interfaces)
- Archiving (e.g. check of the interfaces with the repositories, etc)
- Publishing (e.g. test of the services interfaces with the common gateways)

The deliverable associated to this subtask is D2600.1

Services chains operations
According to the G-MOSAIC logic, the services chains operations are made up of 2 phases, corresponding to the scenarios deployment. Depending on each defined scenario the service chain operation may have different duration within the deployment timeframes.
The services chains operation includes the activity of integrate and operate services chains participating to common complex scenarios. The operation of such integrated services chains will be done co-ordinately by the respective service chains developer.
The deliverable associated to this subtask is an internal report contributing to D2100.6

Training
This subtask is aimed at producing the needed training material relative to the service chains, i.e. presentations, manuals, sample data.

Progress in G-MOSAIC:

Progress will be achieved by the development of a set of service chains that address the theme of migration in an integrated approach. The set-up is a unique migration multi-monitoring approach, both in time (incl. early warning, prevention and during crisis) and in space (including both specific (border) areas in the origin and destination countries and the long range routes) and will include the characterization of population movements (refugees, terrorist or militia movements, or activities involving smuggling military significant payloads, cargos or weaponry). Special attention will be paid to border crossing activities and military activities in areas adjacent to borders.

Furthermore, significant progress of the service chains will be achieved by the use of TerraSAR-X data which are operational available since early 2008. Furthermore, the satellites capability allows near real-time situation awareness due to a VHR weather and illumination independent sensor. Referring to the information content of SAR images they are highly relevant for the monitoring of activities along migration routes and borders.

Besides TerraSAR-X data, the availability in the very near future of the radar images from COSMO-SkyMed constellation satellites is making more realistic the possibility of a real-time observation of regions of the earth during particular events. The increasing amount of the data available, for a full exploitation of their potential, requires the development of automatic techniques able to extract from the images features of interest (roads, airports, military infrastructures, etc.). The WP aims also at further developing and applying the so called border permeability index maps (which can be considered a result of the NoE GMOSS) . These maps obtained by integrating satellite based images and information derived by other sources allow to have synoptic view of the easiness of a border to be crossed and its suitability to be monitored by satellite or airplane according, for example, to the characteristics of the vegetation covering the area. In the aftermath of a disaster or an event requiring humanitarian intervention a system for the automatic detection of roads will result very useful in determining the road conditions (see Kashmir test case in GMOSS) in order to organize the humanitarian activities.

Based on the definition of "key elements" opportunely defined to detect particular sites (military installations, refugee camps, etc.) the monitoring of the border areas will be periodically carried out using satellite images and especially developed processing chain.

The international community is active on a number of crises and disasters every year.

However, there are numerous ongoing humanitarian crises, especially in Africa, that have been neglected and forgotten for years. This problem is linked to the limited availability of funds internationally, EO can be used to identify, analyze and illustrate current forgotten crises with reasonable costs.

This monitoring of critic areas requires periodic observation of borders looking for emerging signs of

instability; even the border permeability index requires periodic detection of road network status, mainly in remote regions.

A distinction should be made between risk assessment and early warning. Assessing the risk of instability involves analyzing 'structural' factors and can be carried out over variety of timescales from 1 to 15 years. Early warning involves targeted monitoring of emerging signs of crisis and instability. Monitoring strategies should be designed in the context of understanding, they do not attempt to 'predict' crisis but ensure early signs of instability are picked up effectively.

Role of participants
Infoterra GmbH (ITD)
Infoterra GmbH will act as WP manager and coordinate the activities within this work package in cooperation with the partners involved.
Infoterra GmbH will consolidate, test and validate one selected extended route service chain based on multi-source EO data.
In particular, Infoterra GmbH, as provider of commercial TerraSAR-X data and services, is developing and will expand capabilities in SAR images processing and distribution, which allow near real-time situation awareness due to a V1HR weather and illumination independent sensor.
Infoterra GmbH is therefore focusing its involvement on the delivery of analysed and mission-oriented annotated images, and on training in interpreting SAR images.

SRC
SRC will cooperate with IT-D on developing service chains and in demonstrating their performance for a number of service cases. Specifically, SRC will concentrate on gathering and analyzing existing EO data and intelligence information necessary to derive a set of parameters determining the migration routes: trafficking index, permeability index (in cooperation with CRPSM), attractiveness of migration routes and urban development index.
On the technical side, SRC will work, together with SCOR and IT-D, on developing methods of optical VHR and SAR data merging/fusion. These methods will be then converted into operational algorithms and later employed in the WP2600 service chains.
Another area of SRC activity will be the application of statistical methods to interpret the results obtained from the analysis of EO images concerning road traffic, settlement change rate, temporary camps development, etc. The data will be converted to statistical estimators with quantitative assessment errors (confidence level).
Finally, SRC together with other partners will dedicate some effort on validating the WP output through in-the-field inspection (whenever possible), through gathering evidence from witnesses or through exchange of information with local authorities.

EUROSENSE
Based on EUROSENSE's years of experience in VHR urban mapping (also in the GMES context: GMES-GUS, GSE-Land, etc), EUROSENSE will provide their expertise in the field of "urban expansion/settlement devastation and depopulation" and could lead or contribute to the design/set up/testing/demo of a service chain in this context. This could be e.g.:

- Test area: e.g. city and its surroundings in the east-Congo at the border, facing in the past & still now influx of refugees (Depending on budget available for this aspect or linkage with other tasks in this WP also an additional area in Sudan could be taken.)
- Based on a set of archive imagery and new VHR satellite data, a first assessment of the expansion could be made (a "past scenario").
- Based on the above, population estimates and a first indicator analysis could be performed. This should result in knowledge of certain patterns of residency preferences for potential migrants.
- The information extracted from the "past scenario", form the basis for answering questions like: "Where will new big refugees streams go to?", "Can we predict and anticipate certain migration trends, based on first indications of migration or even better on the first indication of local problems?". This information is fundamental for the EU and its partners to plan, anticipate and

even prevent the residency of migrants in certain areas and eventually direct migrants to "better" areas.

EUROSENSE will contribute mainly to deliverables D2600.1 and D2600.2 and in lesser extent to D2600.4 and D2600.6.

CRPSM

The Centre will continue his research activity, already started in the mainframe of a previous GMES initiative, regarding automatic detection and monitoring of man-made infrastructures (roads, airports, buildings, plants, etc.). This approach becomes necessary when large mosaic of satellite images must be processed. Following the definition of a permeability index that can be considered a common output of the cooperative activity of JRC and CRPSM during the GMOSS project, and a first compilation of it for the countries of the Central-Eastern part of Africa the index will be further discussed and computed for all the areas of interest. A validation process of the index should also be part of the activity of the CRPSM.

SCOR

Main SCOR contribution to WP 2600 could be gaining of satellite imagery as well as their elaboration and interpretation. SCOR has personnel trained in intelligence from satellite imagery.

SCOR will concentrate on gathering and analyzing intelligence information such as refugees' camps, migration routes, urban development, out of routes movement, some agricultural aspects (soil use, forests), some environment factors.

On the technical side, SCOR will work, together with SRC and IT-D, on developing methods of optical VHR and SAR data merging/fusion. For some SCOR personnel at the end of 2007 training in radar imagery will be done. Both optical and radar data could be used in the WP2600 service chains.

Finally, SCOR together with other partners will dedicate some effort on validating the WP output through in-the-field inspection.

TELESPAZIO

In continuity with MARISS and LIMES services TPZ will contribute to service chain 2 by monitoring change detection of temporary settlements that are set up along African coast (North and North-West Africa), before the shipment of illegal migrants.
In this activity TPZ will exploit the VHR SAR data sources that are particularly suitable for this application, due to the spatial resolution, all weather monitoring capabilities and high revisit time.
The service will also include optical VHR images analysis for complementing SAR derived information.

Deliverables

Reference	Name	Brief description	Month of delivery
D2600.1	[Routes and borders] Service Chain(s) Prototype	Service Chain prototype is realised before each operational phase	T0+09 T0+24
Internal report	*[Routes and borders] Definition of the Methodology and specification for the Service Chain*	*Internal report contributing to D2100.2*	*T0+06* *T0+21*
Internal report	*[Routes and borders] Service Chain validation plan*	*Internal report contributing to D2100.3*	*T0+09* *T0+24*
Internal report	*[Routes and borders] Service Chain Operation report*	*Internal report contributing to D2100.6*	*T0+21* *T0+33*
Internal report	[Routes and borders] Demonstrator - Operational Manual	*Internal report contributing to D2100.5*	*T0+09* *T0+24*

B.6.3 Support to Crisis Management Operations (WP3000)

The objective of WP3000 is the deployment and operation of service cases in support of crisis management operations, i.e. providing information that support EU and national level users in:

- preparedness activities (e.g. planning for crisis);
- crisis management operations;
- crisis consequences management, reconstruction & resilience.

Each service case represents the project response to a user need, and will be defined, performed and updated throughout the project life.

Even if service cases will be defined and specified during the first phase of the project in accordance with users real and actual issues, a list of service cases is included in this proposal (see chapter B.1.2.2.3). The list was derived according to preliminary interviews with users during proposal preparation and is representative of what would have been the "real" service cases list if the project had started at the time of proposal submission.

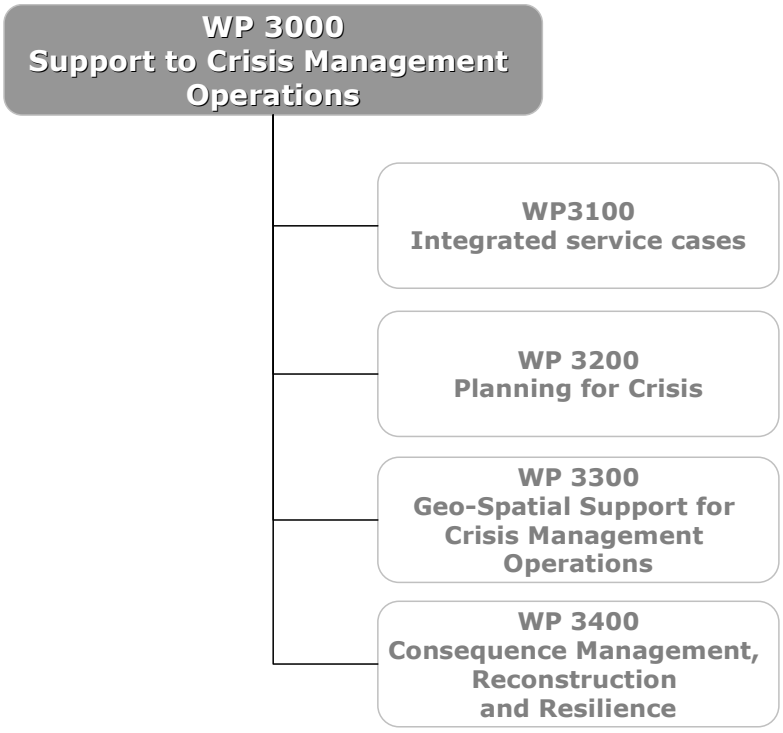
After the first definition phase two major phases of service case "operations" and appraisal will follow.

Since service cases are tightly linked to users operational scenarios and, in general, concern complex problems driven by foreign affair politics and security issues, they are addressed in a separate WP (3100) that includes all activities carried out in relation with users (service case definition, assembly and delivery, appraisal).

The main technical contribution (maps and geo-information) for each service case comes from the service chains developed in WP 3200, 3300 and 3400, the thematic WPs, in which various element (building blocks) are assembled together, following a defined methodology, to build up a service chain.

Each service chain addresses one defined issue (theme) related to security.

The liaison between service cases and service chains is guaranteed by the presence in WP 3100 of all the partners responsible for developing service chains.



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	26	27	28	29	30	32	33	34	35	36	37	39	40	T
		TPZ	INFOTERRA FRANCE	TCF	DLR	INDRA ESPACIO	GMV	EUSC	JRC	SRC	IAI	FRS	SCOR	TAS-I	TAS-F	AN	Astrium SAS	Infoterra UK	ITD	TUBAF	TNO	IMAA	UNIBAS	EUROSENSE	LUISS	SKF	IST	JR	PLUS	PLANETEK	CRPSM	GISAT	KCL	SYNESYS	Adelphi	SISTEMATICA	Swisspeace	
3000	3100	19,0	4,4	0,0	4,6	0,0	0,0	9,0	0,0	0,0	10,3	1,4	0,0	0,0	0,0	0,0	6,3	1,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	9,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	6
	3200	26,0	0,0	0,0	0,0	11,1	14,2	7,0	6,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	7,6	0,0	0,0	0,0	0,0	0,0	0,0	9,5	0,0	10,2	0,0	6,3	0,0	4,1	0,0	0,0	0,0	0,0	0,0	10
	3300	20,0	17,7	0,0	0,0	15,4	14,2	27,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	4,8	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	9
	3400	0,0	0,0	0,0	16,6	0,0	0,0	0,0	6,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	4,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	8,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	3
3000 Total		65,0	22,1	0,0	21,2	26,5	28,3	43,0	12,0	0,0	10,3	1,4	0,0	0,0	0,0	0,0	6,3	1,6	7,6	0,0	4,6	0,0	0,0	0,0	0,0	19,0	0,0	10,2	13,3	6,3	0,0	4,1	0,0	0,0	0,0	0,0	0,0	30

Table B-24: Staff effort for WP3000

Work package n°	3100		Start date or starting event:		T0					
Wok package title:	**Integrated service cases**									
WP leader	TPZ									
Activity type	RDT									
Participant ID	TPZ	Astrium	INFOTERRA FRANCE	EUSC	DLR	FRS	IAI	Skysoft	Infoterra UK	

Objectives

The objective of this WP is to manage the deployment of the service cases in support of crisis management operation. In particular regional crisis (outside Europe) are addressed.
Each service case will be defined in cooperation with users and in accordance with the user's operational context.

As a general approach a service case will be basically an integration of what is produced by one or more service chains, each one addressing a single theme related to security. A first level of integration is performed at the service chain level and involves EO derived products and other geo-referenced information. We will call this first level "thematic" integration (i.e. related to a single theme) and will be carried out by partners within WPs 3200, 3300 and 3400.

Partners in WP 3100 will carry out a second level of integration between the outputs of different service chains. Human expert interpretation will be added, if necessary, at this stage. This integration activity will be implemented on a common service platform, which will act also as a gateway for delivering results to the users.

The operational objective of this WP will be to support user's operations within the context of well defined service cases and to qualify services through the interaction with the user itself (delivery and appraisal)

Users: DG-RELEX (EU), EUMS (EU), SITCEN (EU), Ministero Affari Esteri (Unità Crisi) Users: (IT), French Military Intelligence (DRM) SAG (FR)Centro Nacional de Inteligencia (E), Ministere de la Defense (F), Italian MoD (IT), Spanish, MoD (E), Spanish Foreign Affairs Min (E), Ministério dos Negócios Estrangeiros (P), German reconnaissance institutions, THW (D), Military Cartography Section - Armed Forces (Austria),

Description of work

WP 3100 takes care of service cases from the very beginning of the definition phase to the final appraisal.
The different phases of development for each service cases are traced and put in relation with deliverables in the next paragraph (list of subtask).
In this paragraph we list the preliminarily identified service cases and describe the workflow diagram for a generic service case.

Preliminary list of service cases
This WP groups all the service cases supporting crisis operation
A preliminary list of service cases is outlined here and is based on the understanding of user activities at present. This list is used for defining and dimensioning technological activities (service chains) and for evaluating the amount and type of EO data needed by the project.
On the other hand the list will be subject to modifications according to the following reasons:

- Better understanding of user interests and needs during the first phase of the project
- Change in the areas prone to (or affected by) regional crises which are considered a priority by EU and its member states, in the time span between now and the start up of the project.

Because of the same last reason, changes in the service case list will be likely between the first and the second "service case operation" phase.
For each service case the involved service chains are listed. Sometimes a service case addresses the use of service chains from both WP 3000 and WP2000. The location of these "hybrid" service cases is defined on the basis of the most important service chain involved.

S1. Support to intervention during regional crises (Rapid mapping for security)
This service case addresses support to EU crisis management operations both for humanitarian aid missions and peacekeeping tasks.
Possible areas covered: in the Africa (e.g. Darfur, DRC, …), Balkans, Middle East, Aceh, Iraq, Georgia, Moldova, Somalia.
Type of crisis: Military operations (e.g. peacekeeping, ..), rules of law, police missions, humanitarian aid etc
Rapid mapping products in support of crisis will be prepared following service chain description established in 3300 (e.g. Terrain analysis and mobility assessment, Logistic and deployment operations, …).
Users: EUMS, SITCEN, RELEX
Delivery Platform: EUSCEarth, TIES (TBC)

S2. Support to consular crises
This service case addresses the needs for national foreign affair ministries which are in charge of repatriating EU citizens from crisis areas outside EU.
Possible areas covered: Lebanon (whole state), Sharm el Sheikh (small tourism area), Capital towns in Africa, Angola (part, presence of EU workers), Niger river delta
Users: EU Council, National Foreign affair ministries and Ministers of Defence (Ministero Affari Esteri (Unità Crisi) (IT), Italian MoD (IT), Spanish MoD (E), Ministere de la Defense (F) Spanish Foreign Affairs Min (E), Ministério dos Negócios Estrangeiros (P) Military Cartography Section, Armed Forces (Austria))
Contingency evacuation plans are prepared and maintained on the areas of interest (technical description in WP 3200 Planning for crisis). Plans are uploaded on the service case platform and integrated with other geo-located information (events, news), in order to enhance the level of preparedness. In some cases geo-information provided by WP2000 service chains will be integrated as early warning instrument.
In the occurrence of a crisis the following actions are taken:

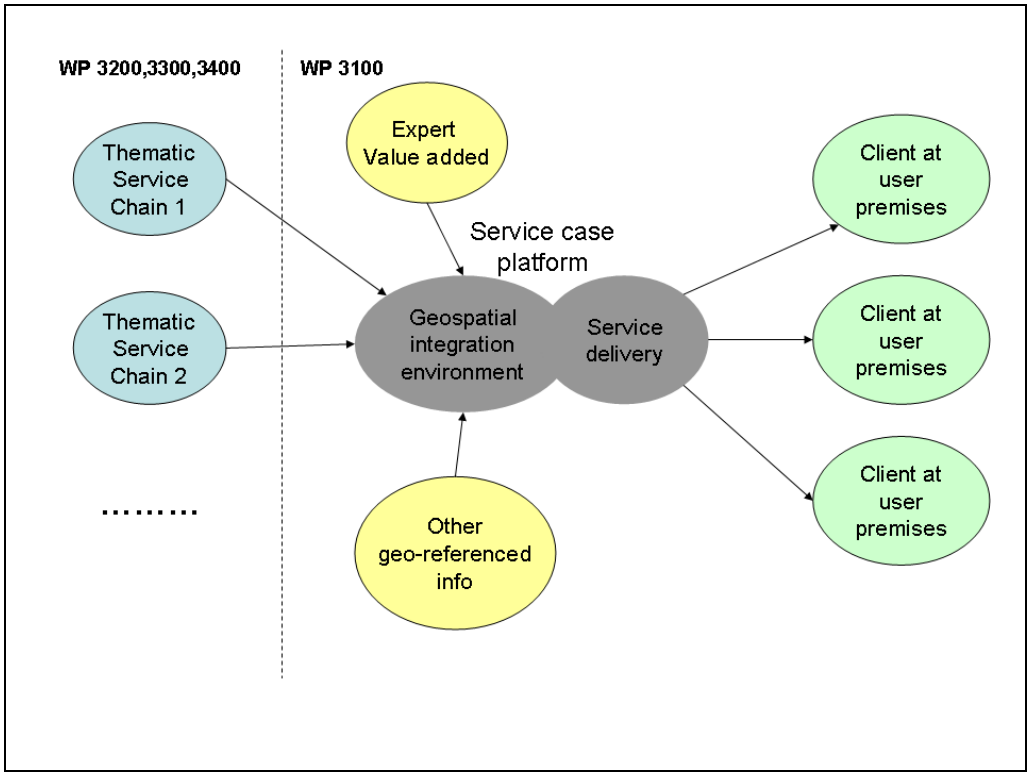
- Fast update of evacuation plans by activating the terrain analysis and mobility assessment service chain (within WP 3300 – Support to crisis operations). The plan itself should provide information about the most critical areas/points to be assessed with the highest priority.
- Availability of position / number of EU citizens located in the crisis area at the user premises (e.g. at MAE)
- Generation of messages (sms, multimedia) to be provided to EU citizens, including instructions derived from the emergency plan and somehow customized according to the geographic location of the receiver.

S3. Support to assessing effectiveness of rehabilitation interventions
This service case addresses the phase after a major conflict (war or civil war) in a country. It aims at supporting EU rehabilitation and reconstruction activities by establishing service chains which contribute to detailed information on the ongoing situation regarding the status of infrastructure availability and resilience. The service case can be divided in itself in two phases: the first phase contains a detailed damage assessment, thus supporting EU donor activities to better estimate the financial impact of the loss of infrastructure in different categories (houses, streets/bridges, industrial facilities; ….). The second phase includes a regular monitoring of the ongoing rehabilitation and reconstruction work, thereby giving estimations on the status of the intactness of the different categories of the infrastructure and of the appropriate deployment of the given funds. Involved thematic work packages are WP 3200 for pre-conflict situation data and information, WP3300 for rapid mapping information during or shortly after the armed conflict and mainly WP3400 with its service chains on damage assessment and reconstruction monitoring.
The resulting information is uploaded on the service case platform and integrated with other geo-located information (events, news), in order to enhance the level of survey.
Possible areas covered within this service case may be countries where an armed conflict has ceased, like in Kosovo, or/and where reconstruction and resilience measures are mainly covered by EU funds like in Afghanistan or Lebanon. For a new conflict which might appear shortly before or after the project start, first results of damage assessment will be gathered within the WP on crisis management

operations WP 3300 and a more detailed assessment will be part of WP 3400.
The foreseen users are DG RELEX, SITCEN, THW (D).

Generic workflow applicable to each service cases

In the following figure a logical architecture of the service case is shown. The major elements of the workflow are then described.



Thematic service chains

The source of geo-information coming from "thematic" WPs (3200, 3300, 3400).

Service case platform

The platform is the central node of the service case network and will carry out the following tasks:

- organising the data flow
- final delivery to the user(s)

In this sense the other components of the network outlined in the figure can be thought as already existing assets to be seamless integrated through interoperability technologies.

Expert value added

More than a component of the system this is a functionality of the gateway which allows:

- The addition of expert interpretation (including political situation analysis, socio economical aspects..)
- The preparation of a report or a dossier in a customisable format.

All these activities refer to the service case as a whole and address political and socio-economical aspect related to it; the final objective of this activity is to provide the users with a service tailored to their need and adopting a common language.

Other geo-referenced info

The preparation of the final delivery might take advantage of other geo-referenced information supporting the analysis of the event. This component could be, for example, the interface with an already existing system carrying out thematic analysis on unstructured information, geo-location of textual information (e.g. geo-located news, events to be integrated providing by TCF)

Client at user premises
Depending on the requirements from specific users the client could provide visualisation functions only or be equipped with interactive analysis tools with the following functionalities:

- integration of additional information (not available to the project)
- interpret, annotate and edit the information provided
- 3D display and build virtual flights

According to users request, the use of handheld in-field terminals, integrating GIS function with TLC and NAV capabilities, will be experimented in some service cases. Functions will include
Access and navigate in the local cartography and geo-information using a simple GIS application

- Self-locate and locate other in-field actors
- Communicate with other on-field actors and with the crisis room in Europe
- Gather and share (with the other field actors and the decision centres) information and geo-information acquired in the field during the experimentation phases

…thus setting up a real "cooperative mapping" environment.

Subtasks
T3110 Definition of service case scenarios with users
Each service case will be defined together with the user(s) with the objective of mainstreaming the newly provided geo-information into the already existing operational flow.
This is achieved by:

- Receive, as an input, the policy framework analysis carried out in WP 4100 in order to ensure the fine tuning of G-MOSAIC with the evolution of EU security policies, also on the organisational side.
- preliminary identification of world critical areas and specific prioritisation by expert users for crisis management.
- Definition of capability needs (analysis of current available capabilities [crisis rooms equipments / information sources / EO products / used platforms]; functional analysis of elementary capabilities needs matching with GMES)
- Defining format and content of the information provided
- Defining the delivery method and the architectural solution for operating the service case.

During this task the potential involved users will be identified with the support of the WP4200, their needs will be analyzed and a service case scenario will be defined together taking in account possible gender issue aspects. Moreover the users will be also involved in the definition of Service Validation Criteria
WP4200 will focus on the identification of the EU actors that contribute to the Security Services provision in terms of data, products, services, and infrastructures, both from the supplier side and the User side. The results of these WP4200 activities will be inputs for WP2000 and WP3000.
During the definition of the Service Cases scenarios with the user will be assessed also the access to user proprietary data, the level of the security and confidentiality of data taking in account that any due agreement with the user will be set up in the SLA and SLS definition in WP6300

The deliverable associated to this subtask is D3100.1

T3120 Service cases specifications
A service case will consist of one or more service chains in the framework of a typical operational scenario (i.e. with a defined area, reference policy, users involved).
This sub-task is aimed at providing the service case "technical" specification in terms of:

- Service chains involved in the services cases.
- Integration of the service chains output on a common platform
- Further information content to be added in order to define the political framework of the service case. Such a task is aimed at providing an information service adopting the same language of the user. This will be achieved by integrating additional open source information and human expert value added.
- Definition of Service Validation and Appraisal Plan

Moreover the Service Provider will be in charge to define also the constraints for the Service Validation.
The deliverables associated to this subtask are D3100.2, D3100.3, by collecting the related inputs from WP3X00.

T3130 Service cases operations
Service cases are operated in this sub task. In terms of project schedule two major cycles of operations and appraisal are defined during the project lifetime.

- Collection and integration of the geo-information generated by the service chains
- Add value based on human expert analysis and integrate other open source information. This activity will be aimed at forming a framework for the service case coherent with user's language, organisation and expectations.
- Deliver the resulting "products" through a common, "network centric" platform with the format and mode defined with the user.

The deliverables associated to this subtask are D3100.4, D3100.5, D3100.6 by collecting the related inputs from WP3X00.

T3140 Validation Task: Getting users feedbacks
As a general approach the service cases will be developed, customised and tuned during delivery. In terms of project schedule two mayor cycles of operations and appraisal are defined during the project lifetime. In both cycles a partial overlap between deployment and operation phase and feedback collection is planned in order to allow for a more flexible and dynamic progress of the project. This means that the following activities will be performed within this sub-task:

- Feedbacks collection during the last part (last 3 months) of the deployment and operation phase by means of periodical meetings, questionnaire submission, interviews. Where feasible, the results of this process will be a dynamic re-tuning of the scenarios and relevant deployment and operation
- Appraisal at the end of the deployment and operation phases. This subtask includes the lesson learnt and addresses the scenarios re-definition, re-focus and update also collection of recommendation for new sensors.

The deliverables associated to this subtask are D3100.8.

T2150 Training session
A training session will be held at the beginning of the two service operations phases, for the main users. Topics of the training will address the content of the pilot services (the geo-spatial information provided) and instructions about browsing and handling such information at the user premise.
The deliverable associated to this subtask is D3100.5

Role of participants
Telespazio will be the main coordinator of this WP.
As a WP leader Telespazio will be the main author of the deliverables of this WP, organizing the contributions of the partners and keeping controlled versions of all deliverables, organizing training sessions for users.
At the operational level a Coordination with SAFER will be carried out in the WP3100 "Integrated Service Cases", by DLR and the EUSC with the support of the industrial partners Telespazio and Infoterra with the objective to activate technical cooperation as to obtain rapid mapping information in case of a complex crises

Roles in all service cases:

Infoterra UK
Infoterra UK, in charge of data repository and data access definition, provision and integration in WP5400, will support a WP2000 common gateway integration of these elements and will then re-use this work to support the integration in WP3000 of these components when used by WP3000 users.

Astrium
Astrium plays a major role in WP2100 for the definition, procurement, customisation and integration of common gateway elements for WP2000 users. Similarly, in WP3100, Astrium will re-use this work supporting the integration of the WP2100 common gateway elements used by WP3000 users.

IAI

IAI will contribute to T 3110 by providing an expert assessment for crisis management with a common methodology. For T 3120 and T 3130 IAI will take into consideration the ongoing EU and MS crisis management policy to provide expert value adding integrated political analysis.

FRS

FRS will contribute to T 3110 ensuring methodological support in a cross fertilization approach with WP2100. Furthermore FRS will contribute to the engagement of French and EU users for crisis management analysis.

Infoterra France
Contributing to T3120 and T3130 by providing handheld in-field terminals integrated with the central system

Roles in Service case S1:
EUSC
Responsible for T3110 (interface with Council), T3130 (service operations on a common platform), T3140 (getting users feedback) and contributing to T3120 (providing technical info on involved service chains)

TPZ
Responsible for T3120 (service case specification)

Skysoft

Contributing to T3110, T3130 and T3140 (interface with Portuguese FA ministry) and reviewing of T3120

Roles in Service case S2:
TPZ
Responsible for T3110 (interface with MAE), T3130 (service operations on a common platform), T3140 (getting users feedback) and contributing to T3120 (providing technical info on involved service chains)
EUSC
Responsible for T3120 (service case specification and expert value adding)
Roles in Service case S3
DLR
Responsible for T3120 (providing technical info on involved service chains), for T3140 (getting users feedback), contributing to T3110 (interface with users)
TPZ
Responsible for T3130 (service operations on a common platform), for T3120 (service case specification and expert value adding), contributing to T3140 (getting users feedback) and contributing to T3120 (providing technical info on involved service chains)
EUSC
Responsible for T3110 (interface with SITCEN), contributing to T3140 (getting users feedback)

Deliverables

Reference	Name	Brief description	Month of delivery
D3100.1	Service Scenarios Definition Document		T0+03
D3100.2	Definition of the Methodology and specification for the Service Chains and Service Cases	The report is issued twice before the operational phases	T0+06 T0+21
D3100.3	Services Validation and Appraisal plan	The report is issued twice before the operational phases	T0+09 T0+24
D3100.4	Service Case(s) Demonstrator	The deliverable is issued twice before the operational phases	T0+09 T0+24
D3100.5	Service Case(s) Demonstrator -	The report is issued twice	T0+09

	Operational Manual and sample data	before the operational phases and receives inputs from the thematic WPs	T0+24
D3100.6	Service Validation and Appraisal report	The report is issued twice after the operational phases	T0+21 T0+33

Work package n°	3200	Start date or starting event:		T0+03	
Wok package title:	**Planning for crisis**				
WP leader	TPZ				
Activity type	RTD				
Participant ID	TPZ	ITD	EUSC	PLANETEK	INDRA ESPACIO
Participant ID	JR	GMV	JRC	Skysoft	GISAT

Objectives
EU foreign policy addressing distant threats (regional crises, proliferation activities, terrorism, violation of treaties) as a high priority concern for European security thus requiring for an early, rapid and, when necessary, robust intervention, together with the increasing presence of EU citizens in third countries (Workers, tourists…) are the two main reasons for setting up a "global level" crisis preparedness activity.

Emergency plans represent the operational tool for crisis preparedness. They can support both interventions in third counties aimed at preserving peace and strengthening international security or the activity of the single EU member states in protection of their own citizens or citizens from other EU countries which have not an embassy or a consular post (as stated by Article 20 of the Treaty establishing the European Community)

The present WP aims at implementing a pilot service chain that would support EU (and member states) crisis management operations outside Europe by providing information supporting planning and preparation activities in occurrence of a regional crisis:

Topics addressed will be:

- Preparation/planning of missions (inspectors / observers / NGOs)
- Preparation of events (e.g. elections)
- Protection of EU Citizen abroad (planning for evacuation / repatriation)

Users: DG-RELEX (EU), EUMS (EU), SITCEN (EU), Ministero Affari Esteri (Unità Crisi) Users: (IT), French Military Intelligence (DRM) SAG (FR)Centro Nacional de Inteligencia (E), Ministere de la Defense (F), Italian MoD (IT), Spanish, MoD (E), Spanish Foreign Affairs Min (E), Ministério dos Negócios Estrangeiros (P), THW (D), Military Cartography Section - Armed Forces (Austria)

Description of work
The overall objective of the WP is to develop and run a service chain which will provide geo-spatial information within the framework of services cases scenarios set-up in WP 3100
Users of the geospatial information provided will be EU crisis centres (DG-Relex and SitCen) and crisis centres in the Foreign Affairs Ministry of single EU countries (Ministero Affari Esteri (Unità Crisi) (IT). Spanish Foreign Affairs Min (E), Ministério dos Negócios Estrangeiros (P))

Service chain 1
Contingency plan preparation

Description
This service chain provides geo-spatial information in support of emergency planning (both for evacuation of EU citizens and for intervention) . The service chain will be activated during "peace time" in preparation for contingencies and will include the following steps:

1. Choice and acquisition of EO data (optical HR and SAR HR)
2. Ortho-rectification and co-registration of data
3. Extraction of 3D information from data (DEM and relevant structures)
4. Integration of additional geo-spatial information relevant for the plan (e.g. admin boundaries, road network, airport, critical buildings, infrastructures, hydrography…) either extracted by image

analyst from the image or coming from external sources
5. Identification of areas critical for the emergency planning to be updated immediately during crisis.
6. Preparation for plan delivery with 2D, 3D visualisation on globe viewer.

The elements of the emergency plan will be integrated on a GIS environment which will include the following layers:

- Basic map (and or image) layer. Updated with new satellite/aerial images acquisition
- Vector representation of emergency routes (e.g. evacuation ways) with highlighted critical areas/points to be verified immediately after the occurrence of a crisis
- Communication and transportation infrastructures relevant for the plan
- UE countries embassies/consulates and other building identification and characterization

Estimated surface
According to the selected service cases map scales could range from 1:50.000 to 1:10.000 and involve areas between 10.000 Sqkm (a small country like Lebanon) and 100 SqKm (a big town)

Target timeframe
During the project lifetime two "service delivery" phases corresponding to about two years

Mapping frequency
The plan will be updated two times per year

Delivery timeliness
No need for a rapid delivery

Assessment of EO data needed:
- Type: Optical HR, VHR and SAR VHR
- Resolution: HR, VHR
- Mode: on demand
- Volume : 50 images (20 optical 10 VHR, 10 HR, 30 radar VHR)

Subtasks
Identification of building blocks
The building blocks are the elements used to implement the service chains through proper methodologies. G-MOSAIC will use already existing building block derived by previously or ongoing projects and initiatives, both GMES and non-GMES, addressing topics of interest for security purposes. WP4200 will generate a document, in the early stages of the project, listing all the available building blocks. The constituent elements for each service chain will be selected among these.

Definition of methodologies and services chains specifications
A methodology describes the process through which existing building blocks are combined in order to provide, as a result, information supporting thematic tasks. The methodologies are presented by flow diagrams which define the relation between the building blocks. The methodologies have to take into account interoperability aspects related to:
- the integration of different service chains in complex scenarios
- the integration of the service chains output in a common gateway
- the interfaces with the context data needed to complement the service chain outputs (socio-economic data, reference updated information)

Eventually, the methodology has to take into account the relation with its outputs with the scenario dossier.
Once a methodology is defined, it is implemented by setting up a work flow.
The deliverable associated to this subtask is an internal report contributing to D3100.2 and D3100.3

Services chains methodology implementation
A service chain is the technological implementation of a developed methodology, including its interfaces with the common gateway(s) The implementation may address the integration of different service chains in complex scenarios. At the end of the implementation phase a service chain is ready to be used in the deployment and operation of a defined scenario, in a stand alone mode or coupled with other service

chains participating to a complex scenario.
As part of the implementation there is a service chain test addressing, where applicable, the following macro-functionalities:

- data procurement (e.g. acquisition of EO data in case of monitoring services, etc)
- data processing (e.g. test of the modules dedicated to pre-processing/processing/post-processing and their interfaces)
- Archiving (e.g. check of the interfaces with the repositories, etc)
- Publishing (e.g. test of the services interfaces with the common gateways)

The deliverable associated to this subtask is D3200.1

Services chains operations
According to the G-MOSAIC logic, the services chains operations are made up of 2 phases, corresponding to the scenarios deployment. Depending on each defined scenario the service chain operation may have different duration within the deployment timeframes.
The services chains operation includes the activity of integrate and operate services chains participating to common complex scenarios. The operation of such integrated services chains will be done co-ordinately by the respective service chains developer.
The deliverable associated to this subtask is an internal report contributing to D3100.6

Training
This subtask is aimed at producing the needed training material relative to the service chains, i.e. presentations, manuals, sample data.

Role of participants
TPZ
TPZ has a long experience in SAR data processing; It has developed VHR SAR processors for Cosmo SkyMed mission, including value added products such as DEM, DSM extraction, mosaicking, SAR and optical data matching/registration.
The main topics of the chains, TPZ will provide and contribute are:

- Service chain provider
- Ortho-rectification (when needed), and Co-registration of images (including SAR with optical)
- SAR VHR data processing / DSM / DEM extraction
- WP specific training

TPZ is responsible for the deliverable within the WP, D3200.1 and for collecting all the contributions to WP 3100 deliverables

JR
JR can contribute within this WP by providing the following building blocks which are being developed in LIMES and GMOSS project:

- 3D object reconstruction (from SAR and optical images)
- 3D change detection

JR will contribute to WP Deliverables.

EUSC
EUSC represents, in this WP, the liaison with WP 3300, since they represent two different stages of the same activity.

- contributing to the service chain with emergency plan preparation on a GIS environment
- 3D visualization of emergency plans and preparation for delivery on a globe viewer (e.g. Google Earth)
- Liaison with EU Council Users SITCEN and EUMS
- Whenever copyright and confidentiality issues permit, use of already existing data (maps, products, etc) at the EUSC for evacuation contingency planning.

- Liaison & coordination with WP3300

EUSC will contribute to WP Deliverables.

Infoterra GmbH (ITD)
Will contribute in the following topics:

- VHR SAR multi pol data processing (e.g. TerraSAR-X)
- Next generation DEMs (2m resolution relative) derived by VHR SAR data
- Delivery of analyzed and mission-oriented annotated images.
- SAR training in interpreting SAR images.

Infoterra GmbH can deliver value to the WP Deliverables.

GMV
Experience includes automatic data fusion process for high resolution data: Thermal, Optical, SAR (Helios-2, Quickbird, airborne,…) for both military and civil application. Automatic map generation, for operation in case of disasters or military activities, including ortho-rectification, mosaics generation, change detection and integration in a GIS based system with geo-information.

- Support to overall chain definition
- Generation of DEM/DSM based on optical data
- Fusion of HR SAR and Optical data
- GIS integration

GMV will contribute to the WP deliverables.

INDRA ESPACIO

- VHR and SAR image processing
- Generation of DEM/DSM based on optical data
- Image interpretation and feature extraction
- Integration of available additional geo-spatial information
- GIS integration

INDRA ESPACIO will contribute to the WP deliverables.

JRC
JRC is in direct contact with Commission services that are involved in international crisis monitoring and coordination (e.g. the DG RELEX SITCEN). It has ample experience in relevant geospatial data processing techniques.

define methodology for the service chain and quality assessment and validation of the service chain products
images interpretation and extraction of elements relevant for emergency planning preparation
interface with DG RELEX in service evaluation

JRC will contribute to WP deliverables.

GISAT
GISAT experiences cover wide range of services based on EO data processing and analysis. They include both basic data processing issues (pre-processing, orthorectification, DEM generation, ...) and image exploitation activities (interpretation, classification, feature extraction, change detection, ...).

- contributing to image selection / pre-processing (optical images co-registration)
- geo-referencing of map based information

- images interpretation and feature extraction

GISAT will contribute to the WP deliverables.

Skysoft
In close relation with the activities performed under WP 3100 and taking advantage of the experience in EO and Security domains, SKF will contribute, in close relation with users, to the service chain. In particular,

- contributing to image selection / pre-processing (co-registration),
- provisioning of additional geo-spatial info (for some defined areas) and
- contributing to plans update (previous tasks, change detection and ancillary data update).

SKF will contribute to the WP deliverables.

PLANETEK
PLANETEK has an established experience in SAR and Optical data processing; It has contributed to the development of VHR SAR processors for Cosmo SkyMed mission, like, in particular, the Mosaicking Processor of SAR and DEM products. Moreover PK has matured experience in Soil Sealing inside UE27 plus Europe collaborative states.

- Contribution and support to Orthorectification
- Contribution to image processing (Soil Sealing extraction)
- Contribution to SAR and Optical VHR processing

PLANETEK will contribute to the WP deliverables.

Deliverables			
Reference	Name	Brief description	Month of delivery
D3200.1	[Planning for crisis] Service Chain(s) Prototype	Service Chain prototype is realised before each operational phase	T0+09 T0+24
Internal report	*[Planning for crisis] Definition of the Methodology and specification for the Service Chain*	*Internal report contributing to D3100.2*	*T0+06* *T0+21*
Internal report	*[Planning for crisis] Service Chain validation plan*	*Internal report contributing to D3100.3*	*T0+09* *T0+24*
Internal report	*[Planning for crisis] Service Chain Operation report*	*Internal report contributing to D3100.6*	*T0+21* *T0+33*
Internal report	*[Planning for crisis] Demonstrator - Operational Manual*	*Internal report contributing to D3100.5*	*T0+09* *T0+24*

Work package n°	3300	Start date or starting event:		T0+03		
Wok package title:	**Geo-spatial support for Crisis Management Operations**					
WP leader	EUSC					
Activity type	RTD					
Participant ID	EUSC	TPZ	INFOTERRA FRANCE	GMV	INDRA ESPACIO	PLUS

Objectives

In accordance with Article 17(2) of the Treaty on European Union, EU Crisis Management Operations include:

- humanitarian and rescue tasks;
- peacekeeping tasks;
- tasks of combat forces in crisis management, including peacemaking.

In coherence with Generic Space Systems Needs for Military Operations document endorsed by PSC (Political Security Committee), geo-spatial support for crisis management operations comprises permanent tasks such as monitoring of potential crisis areas including strategic planning (e.g. evacuation plans, etc) and non permanent (on-demand) tasks such as rapid theatre situation assessment, assessment of result of operations.

The present WP aims at implementing pilot service chains that would support EU Crisis Management operations.
It is worth to note that WP3300 deals with the immediate reaction to a crisis (say within the first weeks of a short crisis, or longer for an ongoing one), while all services dealing with post-crisis: reconstruction, rehabilitation and resilience will be carried out in the following 3400. So results of 3300 will be used to start with for the phase after the conflict in WP 3400.

This implementation will take into account EUMS, SITCEN and other relevant MS institutions (such as Foreign Affairs Ministers) needs in an inter-pillar spirit. The WP will first focus on two service chains based on past experience of the EUSC that will be developed and fined tuned with users.

Users: EUMS (EU), SITCEN (EU), Ministero Affari Esteri (Unità Crisi) Users: (IT), French Military Intelligence (DRM) SAG (FR), Centro Nacional de Inteligencia (E), Ministere de la Defense (F), Italian MoD (IT), Spanish, MoD (E), Spanish Foreign Affairs Min (E), Ministério dos Negócios Estrangeiros (P), German reconnaissance institutions, THW (D), Military Cartography Section - Armed Forces (Austria)

Description of work

The service will use, to the best extent, tools and concepts made available by the GMES Rapid Mapping Core Service when appropriate. By integrating them in the Security domain, G-MOSAIC partners will add value for specific users taking into account their security requirements.

Service centres developed within the framework of GMES mapping will run the service chains. Key features of these elements (which are even more important in the security domain than in natural risk crisis management) are the robustness of the tools, their simplicity of use, and their ability to operate in any part of the world (e.g.: telecommunication availability).

Since this WP is addressing on-demand tasks, the volume of service required could vary in time, however to maintain the service active and ready, Infrastructure and personnel will made available during the full duration of the deployment of the service (i.e. from ML2 to ML5).

The two service chains described hereafter are based on past experience of the EUSC with EU users and therefore will very likely be developed, however their definition might change slightly and being improved after service case scenarios definition with G-MOSAIC users (WP3100 - first phase of the project) and

consequent demand for geo-spatial information to be produced by the service chains.

Service chain 1
Terrain analysis and mobility assessment (non permanent task)

Description
This service chain addresses rapid assessment of assets status to be performed in the occurrence of a crisis. Timeliness of this action (few hours) and high repetition frequency (1/day) are the main driving requirements for this service.
In order to be compliant with requested rapid response times, information on precursor events (and news) and indicators generated by WP 2000 service chains will be made available at the service case level (triggering factors).

The geo-spatial information provided will be used for example to correctly activate emergency plans for evacuation and/or intervention.
The final product will include the following information:

- Terrain "going" classification (Go, Restricted Go, Very Restricted Go)
- Weighted Travel Cost layer
- Updated road network (including obstacles such as rocks, landslides, destroyed bridges, etc.)
- Critical infrastructure status

Other layers included in the final product are:

- Toponomy and Administrative boundaries
- Digital Elevation Model
- Updated Land Cover derived from classification of recent satellite image
- Hydrology
- Geology
- Soil

Estimated surface
One basic map RGIS over 10 to 100 Sqkm (scales from 1:250K to 1:10K)

Target timeframe
The service chain will be developed during the firsts nine months (t0 -> t0+9) and then will be provided till project end.

Mapping frequency
Typically two to three activation a year with about 3 maps for each activations (a total of 15 maps foreseen to be produced in this WP for the whole project)

Delivery timeliness
Within 12 hours to 24 hours after data acquisition. Data acquisition to be performed

Assessment of EO data needed (first approximation):
- Type: Manly Optical, High resolution SAR to be tested
- Resolution: HR, VHR, MR
- Mode: on demand
- Volume : **35** images (optical: 10 VHR, 5 HR, 5 MR / Radar: 5 VHR, 3 HR, 2 MR)
- DEM – 5 HR

Format
GEOPDF/PMF
Map service

Paper map
Diffusion
HTTP/FTP/CD-DVD

Service chain 2
Logistic and deployment operations (permanent task)

Description
This service chain will produce geo-spatial information useful for the preparation of emergency plans, support to logistics and deployment of people, submission of means and materials.
The contents of the products of this service chain are quite similar to what is produced in WP 3200, the main difference being the time framework in which the products are generated. WP3200 deals with contingency plans prepared during "peace time" where a crisis is expected (according to crisis indicators – see WP 2000).
On the other hand this service chain addresses unexpected or at least unprepared crises at the time of their occurrence.
According to what will really happen during the project lifetime in terms of regional crises, it is envisaged that some modification in the balance between activities in WP 3200 and 3300 could happen. This should be quite straightforward since the main actors (EUSC, TPZ, ITG) are involved in both WPs.

Necessary layers:

- Toponomy and Administrative boundaries·
- Digital Elevation Model·
- Land Cover
- Hydrography
- Road network
- Rail network·
- Waterlines
- Harbours and Ports (if area of operations is not landlocked)·
- Airports and airfields
- HLS or potential HLS
- Shelter
- Storage Areas
- Meeting and/or distribution points

Estimated surface
One basic map RGIS over 10 to 100 km square meters (scales from 1:1M till 1:10K)

Target timeframe
The pilot service will be developed during the firsts nine months (t0 -> t0+9) and then will be provided till project end.

Mapping frequency
Typically two to three activation a year with about 3 maps for each activations (a total of 15 maps foreseen to be produced in this WP for the whole projects)

Delivery timeliness
Within 12 hours to 24 hours after data acquisition.

Assessment of EO data needed (first approximation):
- Type: Manly Optical, High resolution SAR to be tested

- Resolution: HR, VHR, MR
- Mode: on demand
- Volume : **35** images (optical: 10 VHR, 5 HR, 5 MR / Radar: 5 VHR, 3 HR, 2 MR)
- DEM – 5 HR

Format
GEOPDF/PMF
Map service
Paper map
Diffusion
HTTP/FTP/CD-DVD

Subtasks
Identification of building blocks
The building blocks are the elements used to implement the service chains through proper methodologies. G-MOSAIC will use already existing building block derived by previously or ongoing projects and initiatives, both GMES and non-GMES, addressing topics of interest for security purposes. WP4200 will generate a document, in the early stages of the project, listing all the available building blocks. The constituent elements for each service chain will be selected among these.

Definition of methodologies and services chains specifications
A methodology describes the process through which existing building blocks are combined in order to provide, as a result, information supporting thematic tasks. The methodologies are presented by flow diagrams which define the relation between the building blocks. The methodologies have to take into account interoperability aspects related to:

- the integration of different service chains in complex scenarios
- the integration of the service chains output in a common gateway
- the interfaces with the context data needed to complement the service chain outputs (socio-economic data, reference updated information)

Eventually, the methodology has to take into account the relation with its outputs with the scenario dossier.
Once a methodology is defined, it is implemented by setting up a work flow.
The deliverable associated to this subtask is an internal report contributing to D3100.2 and D3100.3

Services chains methodology implementation
A service chain is the technological implementation of a developed methodology, including its interfaces with the common gateway(s) The implementation may address the integration of different service chains in complex scenarios. At the end of the implementation phase a service chain is ready to be used in the deployment and operation of a defined scenario, in a stand alone mode or coupled with other service chains participating to a complex scenario.
As part of the implementation there is a service chain test addressing, where applicable, the following macro-functionalities:

- data procurement (e.g. acquisition of EO data in case of monitoring services, etc)
- data processing (e.g. test of the modules dedicated to pre-processing/processing/post-processing and their interfaces)
- Archiving (e.g. check of the interfaces with the repositories, etc)
- Publishing (e.g. test of the services interfaces with the common gateways)

The deliverable associated to this subtask is D3300.1

Services chains operations
According to the G-MOSAIC logic, the services chains operations are made up of 2 phases, corresponding to the scenarios deployment. Depending on each defined scenario the service chain operation may have different duration within the deployment timeframes.
The services chains operation includes the activity of integrate and operate services chains participating to common complex scenarios. The operation of such integrated services chains will be done co-ordinately by the respective service chains developer.
The deliverable associated to this subtask is an internal report contributing to D3100.6

Training
This subtask is aimed at producing the needed training material relative to the service chains, i.e.

presentations, manuals, sample data.

Role of participants
EUSC
Responsible for Identification of building blocks, Services chains operations and production of Training Material (plus production of all related deliverables)

TPZ
Responsible for the Definition of methodologies and services chains specifications, (plus production of all related deliverables)
provider of HR radar DEM (at least 500 SQR Km in total)
provider of rapid mapping products (Assessment maps) based on VHR SAR data (from ortho-rectified data to co-registration, change detection for damage assessment and feature extraction)

Infoterra France
Responsible for Services chains methodology implementation (plus production of all related deliverables)
provider of HR optical DEM (at least 500 SQR Km in total)
provider of reference maps about the crisis area, combining "standard" topographic information, key infrastructures and assets

INDRA ESPACIO
Responsible for Damage assessment tasks (plus supporting EUSC/TPZ/ITG in production of deliverables)

PLUS-Z-GIS
Methods for automatic rapid mapping, vector digitisation (plus supporting EUSC/TPZ/ITG in production of deliverables)

GMV
GMV will be service provider for service chain #1. In particular GMV will provide building blocks based on high resolution SAR and optical satellites change detection in 3D. As part of this activity GMV will take care of EO data sources availability, data fusion. DEMs generation. Spatial reasoning (the goal is to move from GIS technology as "just" a repository of geo-localized information and data, to a true capacity of analysis of those data for the design of a strategy to face a particular situation, taking into the different dimensions of the problem: population, vital resources, transport networks, housing)

Deliverables

Reference	Name	Brief description	Month of delivery
D3300.1	[Geospatial support for crisis management operations] Service Chain(s) Prototype	Service Chain prototype is realised before each operational phase	T0+09 T0+24
Internal report	*[Geospatial support for crisis management operations] Definition of the Methodology and specification for the Service Chain*	*Internal report contributing to D3100.2*	*T0+06* *T0+21*
Internal report	*[Geospatial support for crisis management operations] Service Chain validation plan*	*Internal report contributing to D3100.3*	*T0+09* *T0+24*
Internal report	*[Geospatial support for crisis management operations] Service Chain Operation report*	*Internal report contributing to D3100.6*	*T0+21* *T0+33*
Internal report	*[Geospatial support for crisis management operations] Demonstrator - Operational Manual*	*Internal report contributing to D3100.5*	*T0+09* *T0+24*

Work package n°	3400	Start date or starting event:		T0+03			
Wok package title:	**Consequence management, reconstruction and resilience**						
WP leader	DLR						
Activity type	RTD						
Participant ID	DLR	JRC	PLUS	TNO			

Objectives
The overall objective of the WP is to develop and run two service chains which will provide information within the framework of services cases scenarios set-up in WP 3100 for post-conflict situations.
Results of 3300 will be used to start with for the phase after the conflict in this WP 3400.

Wars or civil wars have dramatic humanitarian and financial consequences to the affected countries. The damaged infrastructure (e.g. houses, streets, industry, electricity and water network), hinders the normal life for the population for a longer period even after the combat operations. The impact on society though results also on indirect damages e.g. to the normal flow of goods and services. Therefore a qualified damage assessment, which can be achieved with remote sensing technologies, using also information from local authorities, will lead to better knowledge about the actual state within the affected region.

The recovery and reconstruction activities for the infrastructure and the mentioned flows play a dominant role in re-establishing good living conditions. The financial needs for this process have to be determined as soon as possible and also the resilience measures are important for long term stabilisation of the concerned structures. Also here remote sensing can play an important role for the provision of information on the status of the reconstruction activities and can therefore contribute to the support of reconstruction missions and as well to a supervision of the appropriate utilisation of the allocated funds. Remote sensing data used for the analysis will not be sensitive data (no security restrictions apply) and results will only be published some time after the conflict.

An optimal approach consists in the two-way coupling between rich in-situ content (e.g. detailed reports on reconstruction of individual buildings or infrastructure) and information derived from the image products. On the one hand, the detailed in-situ data will allow extrapolation to other observed damage in the area while also detailing limitations of the image-based assessment approach (e.g. due to the vertical perspective of the image). At the same time, the imagery will assist in a comparative analysis of areas where other reconstruction (e.g. financed by other parties) is ongoing. Conversely, this will lead to extended, but targeted in-situ information collection that further completes overall information on the reconstruction progress.
This mutual coupling is crucial to appreciate the quality of the EO-derived damage estimates in comparison to the true damage as assessed from local observations. Such a quality assessment would allow the derivation of correction factors for different classes of damaged objects (infrastructure, housing, industrial real estate).

Data aggregation techniques, i.e. based on statistical sampling theory, need to be incorporated to extrapolate reconstruction progress to regional levels. These techniques need to be coupled to valuation methods that allow the damage and reconstruction to be expressed in monetary terms. The latter requires a systematic methodology to capture economic parameters (e.g. price estimates of local labour, materials) as affected by the actual status of the crisis situation (inflation estimates in uncontrolled market situations, logistics costs, long term resettlement perspectives, etc.)
Even when the analysis mainly targets on damage assessment and reconstruction of infrastructure, also the people affected will be of interest. Questions to be analysed are: Who is affected most by the damages (e.g. destruction of residential areas at night: whole families, at days: mostly women and children)? Who is doing the reconstruction (are the men still engaged in terminating the conflict – soldiers? – while women already start the reconstruction)? Up to now there is a lack of extensive reliable data, especially of gender disaggregated data, but it is needed to take into account the gender dimension in the spatial components of the analysis.

Out of the described objectives, the present thematic WP will focus on supporting post-conflict

management operations through two service chains:

- Damage assessment for post-conflict situations
- Support reconstruction missions after conflicts

The regions will be identified together with the users at the project start (within WP 3100). Possible areas/countries are Kosovo or Lebanon at least for the second service chain.

Users: DG-RELEX (EU), EUMS (EU), Ministero Affari Esteri (Unità Crisi) Users: (IT), French Military Intelligence (DRM) SAG (FR)Centro Nacional de Inteligencia (E), Ministere de la Defense (F), Italian MoD (IT), Spanish, MoD (E), Spanish Foreign Affairs Min (E), Ministério dos Negócios Estrangeiros (P), German reconnaissance institutions, THW (D),

Description of work
Service chain 1
Damage assessment for post-conflict situations

Description
Remote sensing can support large area damage assessment after and/or during acts of conflict through wars or civil wars, providing DG RELEX and other users with detailed information about damages to buildings and other infrastructure. In most cases up to now mainly visual interpretation is performed using high and very high resolution satellite data (optical and radar), but lessons learned show that automatic damage assessment methods are of help for the interpreters to do their job faster, more efficient and in a more standardised way. Within projects like RESPONDE, RISK-EOS, GMOSS and others, methods and algorithms have been developed for this purpose. Building blocks out of these projects will be adapted and improved to be able to provide semi-automatic interpretation chains within the envisaged services. Also methods for the efficient division of work over a distributed group of interpreters and the quality control of interpretation results have to be improved and integrated into the process. A novelty in the G-MOSAIC approach is the effort to perform a systematic quality assessment to EO-derived damage indicators and the attempt to express observed damage in monetary estimates by incorporating ancillary socio-economic information.

Estimated surface
The surface covered by the service chain will be one region (part of a country) which has been subject to warfare in the past and will cover a region of about 700 km². The size may not cover the whole affected region but should show major damages within cities and villages and demonstrate the possibilities of the service chain.

Target timeframe
For the time period of several months the chain will be operational and deploy a damage assessment report within the affected region.

Mapping frequency
Very high resolution and high resolution optical EO data (Ikonos and SPOT-5 type data) as well as high resolution radar data (TerraSAR-X and Cosmo-Skymed type data) will be acquired once for the desired region. Possibly data from WP 3300 can also be used for this purpose (rapid mapping after the conflict)

Delivery timeliness
The delivery time of the product is, since it is not very time critical within 2 weeks up to 3 months after data acquisition (depending on the level of accuracy)

Assessment of EO data needed:
- Type: optical and optical-stereo, SAR
- Resolution: VHR, HR
- Mode: on-demand
- Volume : three frames for VHR optical, one frame for VHR optical stereo, one frame optical HR, five frames VHR SAR data, only one acquisition after conflict and pre-conflict image data of same resolution and size

Service chain 2
Support reconstruction missions after conflicts

Description
For the rehabilitation and reconstruction phase also remote sensing techniques like change detection can be of help to monitor the development of the rebuilding of the infrastructure. Especially in the case of large donor contributions by European countries, the monitoring can provide information on the status of the reconstruction activities and can partly contribute to a supervision of an appropriate utilisation of the allocated funds. The support of reconstruction missions is the focus of this service chain. For this purpose, building blocks developed by the partners and from other GMES projects will be identified, combined to a service chain, implemented and operated during the two phases of the project. The chain will focus on monitoring the development and improvement of infrastructure in a semi-automatic procedure also involving the interpreters work and will include experiences from the LIMES project regarding the reconstruction support. A quality control procedure will be integrated in to the process.

Estimated surface
The surface covered by the service chain will be one region (part of a country) which has been subject to warfare in the past and will cover a region of about 700 km². The size may not cover the whole affected region but should show major damages within cities and villages and demonstrate the abilities of the service chain.

Target timeframe
For the time period of about nine months (one period of 6 months, 1st phase and one period of 3 months, 2nd phase) the chain will be operational and deploy a regular monitoring (maps and report)) for the affected region.

Mapping frequency
Very high resolution and high resolution optical EO data (Ikonos and SPOT-5 type data) as well as high resolution radar data (TerraSAR-X and Cosmo-Skymed type data) will be acquired twice during each phase for the desired region. Possibly data from the damage assessment service chain can also be used for this purpose (as input of data before the reconstruction process)

Delivery timeliness
The delivery time of the product is, since it is not very time critical within 1 month up to 3 months after data acquisition (depending on the level of accuracy)

Assessment of EO data needed:
- Type: optical and optical-stereo, SAR
- Resolution: VHR, HR
- Mode: predefined
- Volume : three frames for VHR optical, one frame for VHR optical stereo, one frame optical HR, five frames VHR SAR data, for each data set: two acquisitions with a time distance of at least 3 months and during 1st and 2nd phase of G-MOSAIC (this means four times the mentioned frames)

Subtasks
Identification of building blocks
The building blocks are the elements used to implement the service chains through proper methodologies. G-MOSAIC will use already existing building block derived by previously or ongoing projects and initiatives, both GMES and non-GMES, addressing topics of interest for security purposes. WP4200 will generate a document, in the early stages of the project, listing all the available building blocks. The constituent elements for each service chain will be selected among these.

Definition of methodologies and services chains specifications
A methodology describes the process through which existing building blocks are combined in order to provide, as a result, information supporting thematic tasks. The methodologies are presented by flow diagrams which define the relation between the building blocks. The methodologies have to take into account interoperability aspects related to:
- the integration of different service chains in complex scenarios

- the integration of the service chains output in a common gateway
- the interfaces with the context data needed to complement the service chain outputs (socio-economic data, reference updated information)

Eventually, the methodology has to take into account the relation with its outputs with the scenario dossier.
Once a methodology is defined, it is implemented by setting up a work flow.
The deliverable associated to this subtask is an internal report contributing to D3100.2 and D3100.3

Services chains methodology implementation
A service chain is the technological implementation of a developed methodology, including its interfaces with the common gateway(s) The implementation may address the integration of different service chains in complex scenarios. At the end of the implementation phase a service chain is ready to be used in the deployment and operation of a defined scenario, in a stand alone mode or coupled with other service chains participating to a complex scenario.
As part of the implementation there is a service chain test addressing, where applicable, the following macro-functionalities:

- data procurement (e.g. acquisition of EO data in case of monitoring services, etc)
- data processing (e.g. test of the modules dedicated to pre-processing/processing/post-processing and their interfaces)
- Archiving (e.g. check of the interfaces with the repositories, etc)
- Publishing (e.g. test of the services interfaces with the common gateways)

The deliverable associated to this subtask is D3400.1

Services chains operations
According to the G-MOSAIC logic, the services chains operations are made up of 2 phases, corresponding to the scenarios deployment. Depending on each defined scenario the service chain operation may have different duration within the deployment timeframes.
The services chains operation includes the activity of integrate and operate services chains participating to common complex scenarios. The operation of such integrated services chains will be done co-ordinately by the respective service chains developer.
The deliverable associated to this subtask is an internal report contributing to D3100.6

Training
This subtask is aimed at producing the needed training material relative to the service chains, i.e. presentations, manuals, rolling demo, etc…

Role of participants
With reference to the WP subtasks, the responsibilities of this WP are distributed as follows:
DLR
DLR has a lot of experience in the subjects of ortho-rectification, co-registration, stereo data processing and of change detection and damage assessment algorithms and processing. Due to projects like RESPOND, RISK-EOS, GMOSS and others, several methods have been developed and compared. Depending on the resolution (VHR, HR) and the type of data (optical, optical stereo, SAR) the processing steps and algorithms are different, but each data have their own advantages and disadvantages. Up to now in general, the main method in operational use is visual interpretation of the data to look for damages to houses, streets, etc., although there exist several qualified methods for automatic damage assessment. These methods though deliver not 100% correct results and often include false alarms. One main focus of the development within G-MOSAIC will be to qualify and combine already existing methods (building blocks) to achieve semi-automatic damage assessment and change detection procedures which will lead to faster and more reliable interpretation/classification results including the visual/manual interpreter.
The main topics of the chains, DLR will provide and contribute are:

- Service chain provider
- Orthorectification, and Co-registration of images
- Optical Stereo data processing, DSM production, 3D change detection
- Semi-automatic damage assessment processing chain
- Semi-automatic infrastructure reconstruction processing chain

- WP specific training

DLR is responsible all the deliverables.

JRC

JRC has extensive experience in damage assessment and reconstruction monitoring through it involvement in the Asian Tsunami, Kashmir and Bam earthquake and Lebanon post-conflict relief and reconstruction action led by DG RELEX and DG ECHO. Especially the Lebanon context has identified the need for methodological development in the EO-based damage assessment process and the subsequent reconstruction monitoring (where EO services have not yet made major contributions). JRC has initiated internal efforts to augment the interpretation process and is exploiting the use of EO data for monitoring the reconstruction process. The combined analysis of field-based information has yielded further insight in its potential to steer the processes. The distributed nature of both the interpretation effort (esp. in rapid mapping contexts) and the targeting and collection of field information requires systematic development of the service. The translation of EO and in-situ derived damage estimates to monetary values has been identified as a critical user requirement, but for which relevant experience is sparse.
The main topics of the chains JRC will contribute with are:

- Development of collaborative, distributed image interpretation methods
- Quality control of interpretation results
- Integration with collateral and ancillary data sets to estimate damage in monitory terms
- Error propagation and sensitivity analysis on relevant data sets to better understand the validity range of the damage figures
- Assist in the development of reconstruction monitoring services
- Liaison with DG RELEX

JRC will contribute to the deliverables

PLUS

PLUS focuses on interoperable GIS usage, spatial modelling, satellite remote sensing, digital cartography and GI-based communication. Participating in GMOSS and LIMES, we utilize cutting edge scientific methods and GI tools for security-related issues embedded in generic workflows for effectively transforming complex geospatial data into policy-relevant information, i.e. conditioned information. The workflows integrate techniques of data integration, information extraction and spatial change detection, quantification and spatial dis-/aggregation, pseudo-realistic 3D visualisation and 3D analytical views.
(1) Data integration comprises collating, referencing and harmonising of both in situ data and EO derived products, while considering guidelines and standards in accordance with WP 4500. Latest GIS technology will be used to effectively integrate all required spatial data and to set up a spatio-temporal data model.
(2) Information extraction and spatial change detection, based on object characterisation and quantification, supports manual interpretation and offers a method for object-based change analysis and object-based accuracy assessment.
(3) Scientific visualisation represents the status of a crisis area in several stages, complemented by figures, graphs and numbers describing the situation more quantitatively. By means of 3D analytical views a spatially disaggregated view of statistical information can be directly linked to the very entire situation on the ground, including auxiliary data sets. We use virtual globes as tools for seamlessly combining data on several scales, referenced on a globe and 3D enabled.
With regard to the training sub-task, we ascertain responsible and sustaining usage of new technologies for informed spatial decisions and policy implementation. The main topics of the chains PLUS will contribute are:

- Data integration and conditioning of information using latest GIS techniques
- Object-based change analysis for detecting and quantifying damages
- 3D visualisation of reconstruction stages and communication using globe viewers
- WP specific training and user engagements

PLUS will contribute to the deliverables

TNO
TNO will assist in the development and running of the damage assessment service chain with MR/HR/VHR SAR change detection technology. It will also assist in the integration of the technology in the service chain, and the fusion of its outputs with geospatial information from other sources (EO and context).
The SAR change detection technology and information fusion will include:

- Pre-processing of SAR images (automatic co-registration of geocoded images to reduce false alarms, speckle suppression)
- Detection of changes and theoretical background
- Reduction of false detections (based on image features and context)
- GIS and geospatial information processing

Pre-processing of SAR images will not include geocoding or orthorectification.
TNO will contribute to the deliverables

Deliverables			
Reference	Name	Brief description	Month of delivery
D3400.1	[Consequence management, reconstruction and resilience] Service Chain(s) Prototype	Service Chain prototype is realised before each operational phase	T0+09 T0+24
Internal report	*[Consequence management, reconstruction and resilience] Definition of the Methodology and specification for the Service Chain*	*Internal report contributing to D3100.2*	*T0+06* *T0+21*
Internal report	*[Consequence management, reconstruction and resilience]] Service Chain validation plan*	*Internal report contributing to D3100.3*	*T0+09* *T0+24*
Internal report	*[Consequence management, reconstruction and resilience] Service Chain Operation report*	*Internal report contributing to D3100.6*	*T0+21* *T0+33*
Internal report	*[Consequence management, reconstruction and resilience] Demonstrator - Operational Manual*	*Internal report contributing to D3100.5*	*T0+09* *T0+24*

B.6.4 Cross-cutting Aspects in GMES Security Services (WP4000)

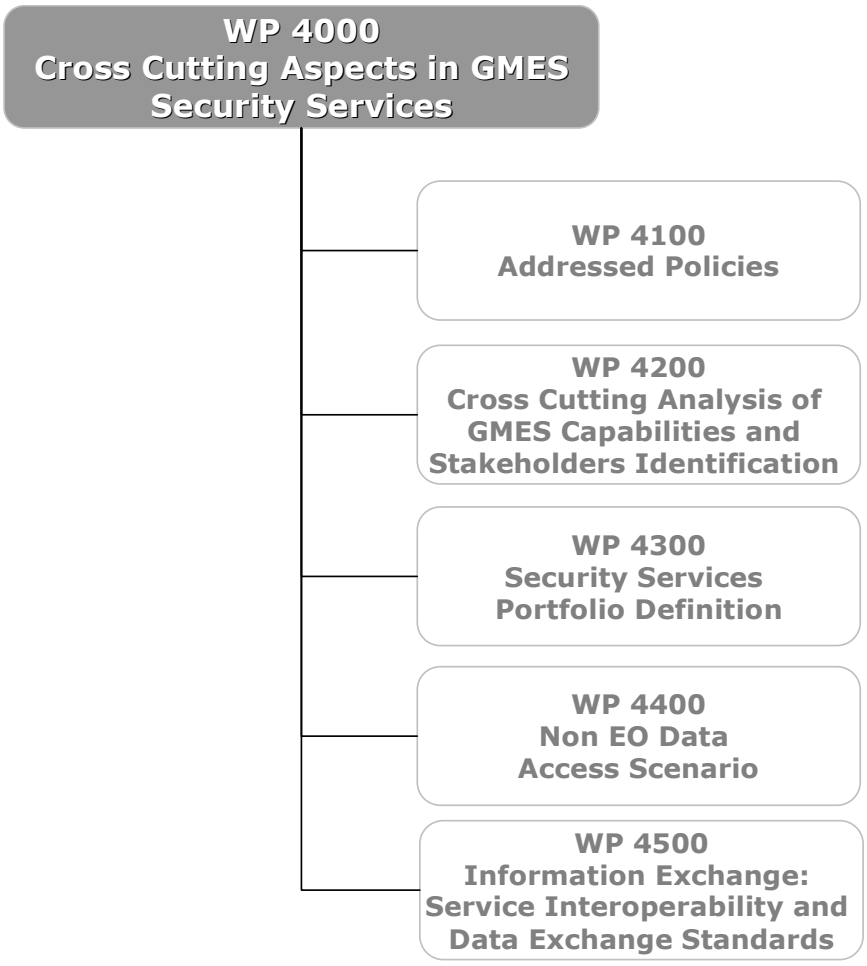
The objective of WP 4000 is to provide G-MOSAIC contribution to the identification of Core Services for Security, within the framework of current status of GMES Initiative as a whole, and to synthesize the global portfolio of services and methodologies (down-stream services) which can support the activities relevant to Regional Crises Situation Awareness and Management Operations.

In this context, G-MOSAIC will specifically contribute to the construction of GMES Services portfolio, by defining the data sources needed to generate them, the actors involved to provide and use them and will contribute as one of the inputs necessary to define a sustainable model for the services provision.

Moreover this WP will support the identification of recommendations for new monitoring sensors to be studied and possibly deployed in future space missions, for the compliance of the GMES Space Segment to the GMES User Community needs.

The results expected by this WP tasks should be included among the contributions to the on-going activities devoted to the specification of the whole GMES Architecture.

The WP activities are performed according to the following organization of work described in the figure above.



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	26	27	28	29	30	32	33	34	35	36	37	39	40	Total
		TPZ	INFOTERRA FRANCE	TCF	DLR	INDRA ESPACIO	GMV	EUSC	JRC	SRC	IAI	FRS	SCOR	TAS-I	TAS-F	AN	Astrium SAS	Infoterra UK	ITD	TUBAF	TNO	IMAA	UNIBAS	EUROSENSE	LUISS	SKF	IST	JR	PLUS	PLANETEK	CRPSM	GISAT	KCL	SYNESYS	Adelphi	SISTEMATICA	Swisspeace	
4000	4100	0,0	0,0	0,0	0,0	0,0	0,0	3,0	0,0	0,0	8,2	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	9,6	0,0	0,0	0,0	0,0	20,8
	4200	4,0	0,0	0,0	0,0	12,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	3,9	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	20,5
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	4500	0,0	0,0	8,8	0,0	0,0	0,0	0,0	11,8	0,0	0,0	0,0	0,0	4,2	10,0	0,0	0,0	0,0	0,0	0,0	0,0	8,9	0,0	0,0	0,0	0,0	0,0	0,0	3,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	47,0
	4000 Total	18,0	6,4	10,9	3,6	20,2	7,1	5,0	11,8	0,0	8,2	0,0	0,0	4,2	10,0	0,0	0,0	3,9	0,0	0,0	0,0	8,9	0,0	0,0	0,0	0,0	0,0	0,0	3,3	0,0	0,0	0,0	9,6	0,0	0,0	0,0	0,0	131,1

Table B-25: Staff effort for WP4000

Work package n°	4100		Start date or starting event:			T0		
Wok package title:	**Addressed Policies**							
WP leader	IAI							
Activity type	RTD							
Participant ID	IAI	EUSC	KCL					

Objectives
The objective of this sub WP is to analyze the overall European framework for security and its evolution. The aim is to assess the addressed policies developed at European level monitoring also the international, political and juridical framework. The WP will chose an inter pillar spirit and will assess consequences for GMES services of such approach, in terms of procedures and related issues.

Description of work
The analysis of the European Policies relevant to Security issues is carried on, up to the identification of the policies that can be supported by G-MOSAIC services. The study will have an inter-pillar horizon, especially concerning those items where the first Pillar (Community), the second Pillar (CFSP & ESDP) and if appropriate the third Pillar (JHA) can contribute. The results of this WP will be inputs for WP4200 and WP5100.

Subtasks
Analysis of general security-political environment taking into account the political juridical and international aspects

Assessment and monitoring of the evolution of security policy in Europe which can be tackled by the security dimension of GMES

Analysis of cross-cutting issues between security and defence EU policies and consequences for GMES with inter pillar approach

Assessment of institutional and organization framework.

Identification of associated issues (such as data sharing, data disseminations)

The methodology applied to all the listed subtask will be the following :

- An initial analysis drafted by IAI in order to prioritise the main policy issues for G-MOSAIC
- A review process of the analysis with all partners and the project coordinator in order to consolidate a strong policy assessment

Role of participants
As WP leader, IAI will integrate the contributions of the partners in the different subtasks and keep controlled versions of the WP report

IAI
Will provide a high level policy guidance applied to GMES security dimension. IAI intend to evaluate GMES policies and to monitor the evolutions of the "S" aspect of GMES, analyzing the blurry border between defence and security and the difficulties that such a separation produces in terms of definition of institutions roles and coordination.
IAI will be responsible of the management of the WP and the deliverables. Each deliverable will analyze the subtasks as defined in the WP description.
IAI will share the responsibility of the following subtasks:

analysis of general security-political environment taking into account the political juridical and international aspects
assessment and monitoring of the evolution of security policy in Europe which can be tackled by the security dimension of GMES
analysis of cross-cutting issues between security and defence EU policies and consequences for GMES with interpillar approach

identification of associated issues (such as data sharing, data disseminations)

EUSC
EUSC will support IAI activities by providing feedback, when appropriate, on ongoing discussions in the context of GMES Security Policies at EU Council Level (e.g. follow up of the outcomes of the Seminar on the GMES Security Dimension). EUSC is also member of the GMES Advisory Council (GAC) and it will take into account important outcomes of GAC, when appropriate.
In particular policy issues related to second pillar users needs for space applications will be addressed in an inter-pillar spirit.
As the only EU agency having an operational mandate in geo-spatial intelligence for many years the EUSC will provide its knowledge of the institutional framework of the second pillar, in particular on policies related to EU Crisis Management Operations.
EUSC will contribute to all the WP subtasks and in particular will be responsible of the assessment of institutional and organization framework.
EUSC will as well contribute to the WP reporting.

KCL
KLC will support IAI by analysing EU security policy in terms of monitoring arms control treaties through GMES services, thanks to its particular expertise in this field. Secondly, KCL will contribute to this WP by developing and evaluating UK position about the evolution of EU security policies with regard to GMES. KCL will as well contribute o the WP reporting.

Deliverables

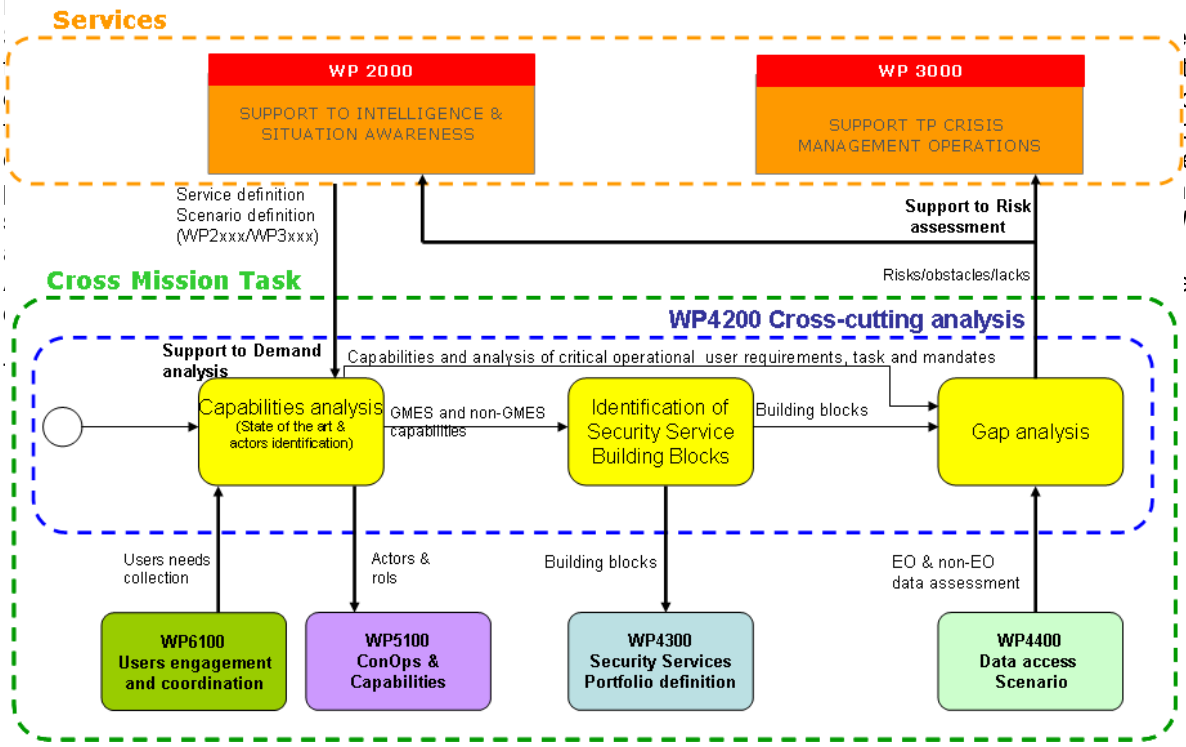
Reference	Name	Brief description	Month of delivery
D4100.1	Reference Policies Identification	The deliverable is issued twice during the project. The first release provides an analysis of general security-political environment assessment for GMES. Security and Defence Cross-cutting issues and related consequences. The second issue provides the final analysis of general security-political environment assessment for GMES, consolidate Security and Defence cross-cutting issues and related consequences and provides the final analysis of associated issues (data sharing and dissemination)	T0+06 T0+21

Work package n°	4200	Start date or starting event:	T0				
Wok package title:	**Cross-cutting analysis of GMES capabilities & Stakeholders identification**						
WP leader	INDRA ESPACIO						
Activity type	RTD						
Participant ID	INDRA ESPACIO	Infoterra UK	TPZ				

Objectives

The objectives of this WP are:

- identification of GMES state of the art technological assets in terms of services, products, methodologies and service architecture elements;
- identification of the EU actors both supplier side and user side;
- support to thematic WP´s design and risk assessment.
- Support (in coordination with WP6100 participants) user interviews and participation in user workshops to support user needs clarification and service definition



Subtasks
WP4200 comprises three subtasks that will be executed twice during the project before each G-MOSAIC operational phases.

T4210. Capabilities analysis (Technological state of the art and EU actors identification)
Inputs:

- inventory of existing technical capabilities in the GMES context (systems, information management systems, framework architecture….)
- scientific issues (knowledge, technology, infrastructures…)
- lessons learned from precursor GMES thematic projects
- former GMES gap-analysis
- ongoing activities in G-MOSAIC WP2000&3000 (user requirements, data assessment,..)
- other related EC geo-spatial initiatives (e.g. INSPIRE)
- EU security policies (from WP4100)
- geo-spatial international standards (ISO 19xxx, OGC,…)
- Service and scenario definitions collected from thematic WP ´s. (Important to know G-MOSAIC demand analysis in subtask T4230)
- Specification phase from WP6100. It comprises a user needs collection during face-to-face interviews with national administrations (French, Italian, Spanish…) and user workshops in coordination with WP6100 participants

…
Also it will focus on EU actors identification both for the supplier side (data providers, service providers,..) and user side (EU and National agencies and administrations) and their roles.

Data capabilities analysis made in WP4400 will be used in T4230 Gap analysis task.

Subtask description.
The analysis shall assemble and synthesize the different input topics involved in the cross-cutting approach for G-MOSAIC.
It includes a comprehensive analysis of users needs, tasks and mandates collected during the specification phase from WP6100 and service and scenario definitions from WP2xxx/3xxx

This subtask will provide a description of the main characteristic (Building Block Identifier, Building Block Group, Product Name, WP Ref, Thematic Area, Product Type,..) of the building blocks as reported and defined in the Annex D.

Each of these topics can be seen as subtask suitable to be assigned between the participants in this WP based on their experience and skills.
The result will be a comprehensive picture of the state of the art that could be exploited for Security related services provisions, and will be documented in D4200.1 (phase 1 and phase 2).

Outputs:

- To T4220 task. GMES and non-GMES capabilities will be provided for Building Blocks identification.
- To WP5100 (ConOps and capabilities). T4210 will provide the identified actors and capabilities to WP5100 as a support for a formal representation within Architecture Framework tools.
- To T4230 task. Capabilities and analysis of critical operational users requirements, task and mandates for Gap analysis

T4220 Identification of Security Services building blocks

Inputs:

- GMES and non-GMES capabilities from T4210. To be on schedule with this task, these inputs must be provided at least on month before dead line.

Based on the existing GMES and non GMES capabilities exploited in the previous task, identifying service elements applicable to the current existing security scenarios in G-MOSAIC domains. This task should support the thematic WPs in identifying the building blocks to be used for the services chains design and implementation. Therefore this task is planned to be executed 2 times during G-MOSAIC, before the services cases operation phases. The results will be documented in D4200.1 (phase 1 and 2)

Outputs:
To WP4300. Building Blocks for Security Services Portfolio definition
To next task T4230. Building Blocks for gap analysis

T4230. Gap analysis
Inputs:

- EO and non-EO data assessment from WP4400
- Building Blocks from T4220
- Capabilities and user requirements gathered in T4210 task

Following the previous subtasks a gap analysis will be undertaken in order to identify possible risks and obstacles to support risk assessment to the thematic WP2xxx and 3xxx.
The gap analysis will comprise a global vision from technical point of view concerning with:

- G-MOSAIC CS Services and architectural issues. This will be the main focus in this task and deals with aspects like constraints for existing CS, new CS to develop in G-MOSAIC, G-MOSAIC architectural security components to implement and services interoperability.
- Data Access analysis derived from WP4400. This task will summarize these results in the final deliverable to give a complete cross-cutting analysis. It deals with the actual inventory on EO and non-EO data and the expected future capabilities (new data sensor, ancillary sources availability, in-situ non-EO data availability)

Any problem detected on these issues during gap analysis need to be put in knowledge to the service providers for risk mitigation.
Another key point to address is G-MOSAIC sustainability. The analysis need to match existing and expected capabilities against user requirements (especially on service scalability) to find a reasonable balance between capabilities and demand.

The final results will be documented in D4200.1 (phase 1 and phase 2)

Outputs:

- To thematic WP2x00 and 3x00. Gap analysis

In all the subtasks, a continuous monitoring on these questions will be held and periodic updated versions of the deliverables will be released, if relevant risks arise.

Role of participants

INDRA ESPACIO
INDRA ESPACIO will be the main coordinator of this WP, compiling and organizing the contributions of the partners in the different subtasks and keeping controlled versions of all deliverables.

INDRA ESPACIO will participate to the following WP tasks:

- T4410: Contribute to stakeholders' analysis and user needs collection within Spain in coordination with WP6100 participants

- T4420: to identify related G-MOSAIC service chain's building blocks derived from GMES product and service developments in which INDRA ESPACIO contributes like BOSS for GMES and Geoland 2.
- T4430: to contribute to the gap analysis to achieve sustainable G-MOSAIC services and to the analysis of their impact.

INDRA ESPACIO will contribute to the deliverables D4200.1,

Infoterra UK
Infoterra UK will participate to the following WP tasks:

- T4410: to analysis available capacities (with the related EU actors) answering to security requirements provided by G-MOSAIC users and accessible by Infoterra and user needs collection in coordination with WP6100 participants, To provide outputs related to Geo-information Standards in which Infoterra is involved (Astrium/Infoterra in member of OGC);
- T4420: to identify related G-MOSAIC service chain's building blocks derived from GMES product and service developments in which Infoterra contribute or contributed in the past.
- T4430: to contribute to the gap analysis to achieve sustainable G-MOSAIC services and to the analysis of their impact.
- Infoterra will contribute to the deliverables D4200.1.

TPZ
Telespazio will participate to the WP tasks as follows:

- T4210 and T4220: conducting the scenario analysis and stakeholder identification relevant to the Italian and Mediterranean area and user needs collection in coordination with WP6100 participants.
- T4220: identifying the building blocks deriving from Telespazio current activities both in specific initiatives directly related with security (such as LIMES) and other Risk Management application applicable to security context

TPZ will accordingly contribute to the WP deliverables.

Deliverables

Reference	Name	Brief description	Month of delivery
D4200.1	Building Block capabilities and GAP Analysis	G-MOSAIC Building blocks capabilities and Gap analysis. The report will be issued twice during the project. The building blocks description will summarize the main characteristic as reported and defined in the Annex D.	T0+3 T0+18

Work package n°	4300		Start date or starting event:		T0+06			
Wok package title:	**Security Services Portfolio Definition**							
WP leader	TPZ							
Activity type	RTD							
Participant ID	TPZ	INFOTERRA FRANCE	DLR	INDRA ESPACIO	GMV	EUSC		

Objectives
The objectives of this WP are:

- to identify the Security Core Service Portfolio, both among the already identified GMES CS and new specific ones for Security;
- to identify and synthesize the specific Downstream Services for geo-spatial intelligence.

Description of work
GMES Core Services are common European information capacities, i.e. those Services providing data and information common to a broad range of policy-relevant applications area and through which important economies of scale can be derived. Core Services are required by a range of policy makers both at European, national and international level. As an example, the provision of a reference map is a Core Service. This Task will perform two kinds of activities:

- It will extract from the results of the Service Cases operations (WP2000, WP3000) the necessary inputs to assess new Core Services according to the criteria for Core Services (with respect to the already identified ones in the GMES initiative as a whole) for the provision of Security related information products (e.g. Regional Crises Situation Awareness and Management Operations)
- It will analyze among the "GMES assets" for Security applications, selected by the study of WP4200, those GMES Core Services that will contribute to the Security Portfolio, and that will be exploited as building blocks in WP2000, WP3000 service cases.

Result will be to contribute to the definition of a Security Core Services Portfolio, that will be made both by services and methodologies already included in the current GMES implementations, and by new services and methodologies specifically developed for the Security applications (and that will be part of the overall GMES architecture and could be also exploited by other application areas, such as emergency response, land, etc.).

Moreover, this WP will analyze the results of WP2000 and WP3000, in terms of developed service chains and methodologies, in order to produce a synthesis and a comprehensive picture concerning the downstream services, and, in general, the methodologies that may support Situation Awareness and Crisis Management Operations. The result will be a contribution to the definition of a set of Information Services that may constitute the GMES Security Service Portfolio.

Subtasks
In order to achieve the WP objectives, the work, described above, has been organised according to the following sub-tasks.

<u>Identification of GMES Core Services for Geo-spatial Intelligence Applications</u>

Based on the existing GMES and non-GMES capabilities identified in WP4200 and WP5100, the Services elements applicable to the G-MOSAIC security scenarios are identified. This task also takes, as "operational" inputs, the identified building blocks (in the Thematic WPs) to be used for the services chains design and implementation.
Based on the analysis of G-MOSAIC user's missions, scenarios and needs, it defines Core Security Services Portfolio. It also analyses the possible synergies (cross-cutting approach) arising from the exploitation of identified Security Service Portfolios in other application field (and vice-versa). This WP is strongly related to WP5000, concerning Architectural design for Security (WP5300); it is also strongly related to the on-going GMES activities outside G-MOSAIC, especially concerning the Core services identification and operations (FTS projects, ad GMES governance and general Architecture set up) The

services portfolios will be issued and updated just before the operational phases and will include the description of the services chains relevant to the Core Services that will be operated within the services cases. A final assessment of the services portfolios will be issued at the end of G-MOSAIC project.

Identification of GMES Down-Stream Services for Geo-spatial Intelligence Applications

Based on the analysis of current service cases operated in G-MOSAIC, this WP identifies services addressable as "general" downstream security services for geo-spatial Intelligence applications. It also analyses the possible synergies arising from the exploitation of identified GMES Services Portfolios in other application field (and vice-versa), and the value addition deriving from the integration of selected groups of Services Elements with other information sources (in situ/non EO). For the identified downstream services specifications will be issued before the G-MOSAIC operational phases and will include the description of the services chains that will be operated within the services cases: while in the WP2000&WP3000 these services are applied to specific Service Cases (identified by the Users), in this WP, the downstream services are specified as general chains, applicable to several situations, and addressing a specific User Segment for a specific Policy sector (as identified in WP4100 and WP4200).
A final assessment of the downstream services will be issued at the end of G-MOSAIC activities, after the further assessment performed thanks to the second phase operations.

Contribution to the GMES Security Services Portfolio Specification

As a further step, after a detailed identification of the GMES Core and Down Stream Services for G-MOSAIC applications, specification documents will be prepared, identifying the up to date actors, assets, context for the GMES CS and DS for Security deployment, within the current scenario of GMES Architecture. In particular the Services will be specified in terms of:

- input data (EO/non EO)
- processing steps
- output (type, format, etc)
- existing providers and service chains contributors
- interfaces with platforms for service delivery.

The services specification will be issued and updated before the operational phases with a final assessment at the end of G-MOSAIC lifetime.
This sub-task will take as an input WP4400, WP4500, WP5200, WP5300, WP5400.

Role of participants

Participants to this WP contribute according both to their role\skills\activities in GMES services provision, and to their specific role within the G-MOSAIC thematic WPs.

TPZ

TPZ performs the technical management of the activities of this WP. TPZ contributes to the definition and identification of Core and Downstream services mainly taking benefits of its experience in security (LIMES, MARISS) and emergency (RISK-EOS, PREVIEW, RESPOND) related GMES services (both based on optical and SAR data), in operational scenarios that can be on-demand, monitoring and imaging, and in the provision of complex VA products. TPZ will also contribute in the field of $(HR)^2$ SAR derived products, thanks to its experience on ground systems and service chains developed for such data sources.
Due to its strong presence on the geo-information services national and international market also non GMES (i.e. expertise in agricultural field, technical/cadastral cartography). Telespazio will bring its knowledge of the users and its consolidated user-driven approach.
Concerning the deliverables, TPZ will be main responsible for D4300.1 also integrating the specific contributions of the other WP4300 partners.

Infoterra France
Infoterra France will contribute to the definition and identification of Core and Downstream services mainly taking benefits of Infoterra experience in land management (GEOLAND …), in emergency (RISK-EOS, PREVIEW, RESPOND) related GMES services, in Humanitarian Aid (RESPOND) , in security (ASTRO+, LIMES), in agriculture field (product FARMSTAR) . INFOTERRA will take benefits for their contributions on

the project as operational coordinator, as WP2100 leader and by using INFOTERRA contributions to many service oriented work packages in the project (Crisis Indicators, Critical Assets, Extended Routes, Planning and Crisis Management)
INFOTERRA will contribute to all WP deliverables.

DLR

DLR will contribute to the definition and identification of Core and Downstream Services thru its leadership of dedicated WPs in this project (e.g. "illegal activities"). DLR has experience in a variety of security and emergency related task, both in development and operations. Thru its involvement in ESA GSE RESPOND and RISK-EOS, as well as thru participation in various GMES related FP6 projects, DLR is experienced in the general structure, requirements and targets of GMES. Moreover. DLR as leader of GMOSS project, will contribute promoting synergies between the two projects.

The operational needs of Core Services can be assessed by DLR thru its operational experience as a Processing and Archiving Centre (PAC) for both national, commercial and ESA Earth Observation Satellites. This includes also operational services for the VHR optical satellites, such as IKONOS, operated by DLR in Oberpfaffenhofen. Near real time services (e.g. rapid mapping) at its own station is one of the assets of the DLR operated Center for satellite based Crisis Information (ZKI). This operational portfolio is amended by working with VHR SAR in various innovative and security relevant modes (e.g. polarimetry, interferometry, moving target detection). All these experiences and sensor modes have been applied in national and European projects.

DLR will also contribute with an overview in national and European security needs, by working closely with national policy, national military mapping and European security entities. The contacts and experiences will be used to contribute to the development of a security services portfolio for a core service and future downstream services in this domain.

DLR will provide contribution to all the WP deliverables.

INDRA ESPACIO

INDRA ESPACIO will contribute to identify GMES DS services for geo-spatial intelligence based on its experience on ESA GSE project GUS (stage 1) and ESA GSE Land (stage 2) for thematic urban mapping (50 UE big urban areas produced, with 1 MMU ¼ Ha using optical VHR data) or ongoing activities in this field in the BOSS4GMES project and Geoland 2. and thanks to the participation in ASTRO+ in 3d modelling for urban and industrial areas.

INDRA ESPACIO will be responsible of "GMES Down-Stream Services for Geo-spatial Intelligence Applications Definition" activity providing specific contribution to the D4300.1

GMV

GMV will contribute on the security service portfolio by bringing experience from GMES services with geo-information which can be part of integrated security services: PROMOTE (air indicators) PRVIEW&RISKEOSS: (floods and fires), RESPOND (mapping response to crisis), FOREST Monitoring (ecosystems effects, fires, CO2,…), ESA SAFE: EO+ telecomm for health indicators + MARISS (maritime security) + LIMES (critical assets, events,…), + MARCOAST + OSIRIS (dealing with integration of in-situ component for security and risk) + GEOCREW (human factors, geo information requirements,…) + PASR activities for borders and Critical infrastructure protection + Defence requirements: GMV has a strong participation in defence projects with NATO, EDA and Spanish national defence department, In addition as GMV is leading HARMLESS Galileo + GNSS + GPS + EO for emergency and security can bring such experience in defining the service portfolio.

GMV will contribute on the security service portfolio providing specific contribution to the D4300.1

EUSC

EUSC will strongly contribute to the identification of the GMES Core and Down-Stream Service, in particular for geo-spatial intelligence.

Providing geo-spatial intelligence is today at the heart of the core operational activity and the mission of the EUSC, therefore the EUSC has the overall technical knowledge to support building GMES Core and Down-Stream Service. Furthermore EUSC will get benefit of the activities developed in LIMES and GMOSS projects since it participate to both.
EUSC will also consider the results of service chains implemented in WP2000 & WP3000 and in particular the WP3300 "Crisis Management Operations" leaded by EUSC.
EUSC will also contribute to the GMES Security Services Portfolio Specification, in particular through high level feedback on user's requirements that will come through WP6100.
EUSC will provide contribution to all the WP deliverables.

Deliverables			
Reference	Name	Brief description	Month of delivery
D4300.1	G-MOSAIC Security Services Portfolio Definition for Core and Downstream Services	G-MOSAIC Services portfolio.	T0+12 T0+30

Work package n°	4400		Start date or starting event:		T0			
Wok package title:	**Non EO Data Access Scenario**							
WP leader	TPZ							
Activity type	RTD							
Participant ID	TPZ	TCF						

Objectives
This WP shall ensure that the collected requirements from the GMES security service providers and their customers are compiled and kept up-to date to ensure a proper matching of the data needs with the supply of and potential new developments in Non EO data and auxiliary data availability. Considering the criticality of the GMES security task, this WP shall also address the requirements in existing, however classified Non EO data from national missions (e.g. Dual use or partly declassified military missions) . This WP will also – to the extent not covered by INSPIRE – address the needs on non-space data. These might include non-space observation systems (e.g. aircraft, UAVs), environmental parameters (e.g. weather situation), GIS information (e.g. maps and charts) and socioeconomic information.
These requirements need to be matched with existing and planned missions. Therefore a survey of these missions including the technical, legal and financial mechanism to obtain this data need to be generated and kept up-to-date in reasonable timeframes. This compilation shall also include the parameters of missions with restricted access, as far as available

Description of work
The activity encompasses to support the supply of critical earth observation data thru the ESA GMES data delivery mechanisms (i.e. HMA, as managed in WP1220) and mechanisms as appropriate to fulfil the needs of service providers on data It shall therefore collect the requirements on data needs of the study team and its users. It also summarizes the possibilities of matching these requirements with existing and planned missions and (non-EO) data sources. Purpose of the WP is also to compile stated requirements on confidential and secure management of non-EO data throughout the entire value chain.

The detailed work in this WP is properly documented.

Subtasks
Compile requirements on non EO-data from the project

The interface manager has to make sure that the requirements in terms of non EO data stated by the project are taken care of in the provision of data. He therefore has to consult the project participants, using the relevant documentation. The requirements on data need to be stated on a "security" mission basis (i.e. different security missions will require different data).
Sources with restricted or limited access to information and data need to be treated as defined in the management with classified information within the project. Special considerations are taken to ensure that the timeliness of the data supply for security relevant mapping purposes is ensured. The formal set of data requirements will be documented.

Compile Portfolio of non-EO data

In situ data: G-MOSAIC will use in situ data (non EO data) either for the optimization of the EO data acquisition and for integration of EO and non EO data for thematic maps production. The main data typologies of in situ data to be analyzed are: meteorological data, topographic and thematic cartography, socio-economic data, intelligence supporting information (newspaper info in data mining tools, etc.). This task is aimed at:
identifying all the typologies of in situ data that are necessary for the generation of the security core and downstream services or that can improve the quality of the services
issuing a Portfolio of Sources providing the collection of information already available from the previous GMES (and not GMES) Projects. For each typology of in situ data identified, the results of the analysis will include the following information:

- data typology;
- data specifications (resolution, scale, legend, frequency, geographical coverage, …..)

- format and delivery procedures
- use in the Project (off-line or on-line requirements, NRT availability);
- data providers;
- access policies (eventually including commercial costs);
- sensitivity of the data;
- the results of this sub-task will be used as inputs by WP4300.

Addressing legal and financial implications

This task is aimed at supporting ESA and the Service Providers to reach agreements with various data providers. This support is limited on stating the requirements from the project and integrating this new data sources in the project. Legal schemes may include the stating of the multi-use license required for the various GMES services. Implications might also be derived from using classified information (though not planned for the duration of the actual project, these considerations need to be done for an operational GMES security service).

Regarding in situ data, the task is aimed at establishing proper *in situ* data access agreements with the relevant providers. The *in-situ* data requirements provided by G-MOSAIC service providers will be analyzed and a selection of *in-situ* data to be acquired will be performed on the basis of the services chains (WP2000/3000) operational needs. For the selected data, agreements with the Providers will be set-up to guarantee the access to the data by G-MOSAIC. Two different kind policies for the access to in-situ data are possible.

- Data available from public regional, national or international entities including defence and security organisations. For these typologies of data providers, agreements will take into account the "Public utility scope of the project" and availability of data will be negotiated on a non-commercial basis. Whether the concerned data could be available from G-MOSAIC users the relevant agreements will be taken in synergies with WP2100 and 3100
- Data available from commercial entities will be evaluated and if necessary negotiated together with the partners operating the related services chains in WP2000 and 3000. (The agreements might be turned into a demonstrative data delivery based upon availability of resources within the project and considering GMES-wide regulations of data availability negotiated thru the European Commission)

The results of this sub-task will be used as an input for WP6300 "SLA and SLS definition".

Addressing next generation of satellites and *in situ* data sources

This subtask includes an assessment of the type of data and level of spectral, spatial and time resolution expected from the next generation of satellites and in-situ data sources. Regarding satellite data, recommendations for new sensors, sensor technologies and operation modes will be stated in the following domains:

- optical geometric resolution and oblique viewing conditions;
- optical spectral capabilities;
- exploitation of SAR polarimetric modes;
- SAR interferometry and in-track interferometry;
- SAR new microwave bands;
- constellation of many satellites;
- new satellites orbits for observation;
- satellites tasking and ground segment enhancement.

Role of participants
DLR

TPZ
TPZ: Main coordinator in collection of data needs requirements and interface to the mission data providers (to a large extend coordinated by ESA) and the G-MOSAIC project. Main coordinator in collecting parameters for existing and planned non EO-missions within the mentioned subtasks. Also TPZ will monitor the data produced by other EC projects (e.g. SAFER) to verify any possible synergies and use of them in G-MOSAIC

TPZ is responsible for the non-EO part of D4400.1 and will include the specific contributions of the other WP4400 partners.

TCF

Contributing to the activities related to G-MOSAIC in situ data providing systems, the selection of in situ data providers and to interface to the in-situ mission data providers; TCF will interface with the National French EO data providers from specific national missions. TCF contributes to D4400.1

Deliverables

Reference	Name	Brief description	Month of delivery
D4400.1	Non-EO data for security missions - Portfolio and Sources	Description of non-EO data for security mission relevant for G-MOSAIC Security Portfolio.	T0+06 T0+18

Work package n°	4500	Start date or starting event:		T0			
Wok package title:	**Information Exchange: Service Interoperability and Data Exchange Standards**						
WP leader	JRC						
Activity type	RTD						
Participant ID	JRC	IMAA	PLUS	Thales Alenia FR	TCF	Thales Alenia IT	

Objectives
This WP aims at maintaining a link between G-MOSAIC and the current activities devoted to interoperability and standardization of geo-information in order to:

- putting the activities relevant to the GMES Security Services definition in the state-of the art frame concerning the structure of the geo-information;
- expanding the scope of the INSPIRE objectives with contributions relevant to the Security Services requirements;
- analyse relevant standards in mapping for security purposes (e.g. ISO/TC211, OGC, DIGEST, MGCP, ANSI INCITS 415-2006);
- devise guidelines for the use of mapping standards at the various interfaces of G-MOSAIC data exchange;
- promote and monitor the use of agreed standards in G-MOSAIC scenarios.

Description of work
Security scenarios addressed in G-MOSAIC are inherently distributed, both amongst G-MOSAIC partners and entities that may hold important ancillary data or are active in collection and assembling of supporting information. This distribution applies both to data sets and relevant algorithms that may be addressable via dedicated service interfaces. Furthermore, security products may be addressed to a number of end-users, each with their own technical capacities to process the products in their decision making environments.

The INSPIRE directive provides a broad harmonisation framework in order to ensure operational coherence between the various building blocks aimed at establishing a European wide infrastructure for spatial information in support of the Community environmental policies. G-MOSAIC is expected to give a major impulse to expand the scope of INSPIRE directive guidelines to the security related policies. Given the scope of the G-MOSAIC project, the focus of this expansion will be aimed at metadata, data harmonization, service interoperability and data and service sharing.

Most of the technical INSPIRE standards are derived from established international standards, typically originating in the ISO/TC211 committee. However, for mapping a number of other standards exists that requires analysis in G-MOSAIC. These standards are related to long term coordination efforts in the security community, and primarily aimed at common mapping symbology, digital formats and system interoperability. The DIGEST and MGCP (VMAP) are 2 prime examples. A more recent Homeland Security Mapping Standard (ANSI-INCITS 415-2006) is evolving to support emergency response mapping requirements.

Beside official standards, a number of industrial de-facto standards exist that are typically bound to software product suites. Increasingly, these standards are based on open XML-based protocols (e.g. KML, GeoRSS, SVG), and are usually derived from existing standards (e.g. GML). The consideration of these standards is important, as they allow new functionality that is often beyond those that are based on agreed official standards (e.g. OGC compliant standards). This is particularly evident for the recent "Earth viewing" applications (e.g. Google Earth, Virtual Earth, WorldWind), which combine access to very large image data sets with integration of geospatial features data and sophisticated visualization functions (3D, time animation). Furthermore, detailed application programming interfaces (APIs) are evolving that allow rapid integration of the new standards in tailor made functional modules. This is obviously very relevant for G-MOSAIC's security scenarios.

Subtasks
Standard inventory

Make and inventory of relevant standards for G-MOSAIC security scenarios and on operational needs from the users in the framework of the Service Oriented Architecture for Security. Standards relevant to data product formats, functional component interfaces, service chaining protocols, mapping symbology, etc. are all relevant in this context.

Analyse the INSPIRE directive to identify scope expansion to the security policies.
This is expected to lead to a persistent role of the G-MOSAIC project in discussion on INSPIRE-inspired directives that address security policies.

Establish G-MOSAIC representation in relevant standardisation efforts (at least observer status), in particular OGC, OSDI and ISO TC/211 committee

Define interoperability concepts to be possibly included in the common portal for G-MOSAIC security services and instruct project partners on the use of relevant standards for data products and data exchange
This includes possible training required to adapt new standards. Identification of Open Source software components for format conversion (e.g. gdal, xslt) is included in this task.

Liaison with WP 4400 and 5300 for system design tasks, with respect to service and product interface integration

Monitor compliancy of partners' data products and data exchange interfaces with agreed standards

Report on G-MOSAIC standards issues
including aspects influencing overall GMES data policies and service implementation strategies.

Role of participants
JRC
- Overall coordination of WP 4500;
- liaison with INSPIRE;
- liaison with WP 4400;
- analysis of relevant standards;
- propose standards for adoption in G-MOSAIC scenarios;
- monitoring compliancy to agreed standards;
- reporting.

IMAA
- Standards for Earth Observation data;
- monitoring compliancy to agreed standards (EO data);
- contribute to reporting.

PLUS
- Represent G-MOSAIC in relevant standardisation efforts (OGC, ISO, INSPIRE)
- monitoring compliancy to agreed standards (geo-spatial feature data);
- contribute to reporting.

Thales Alenia FR
- analyse the technical interoperability (protocols) and operational interoperability (data/information exchange).
- Contribute to reporting

Thales Alenia It.
- contribute to the definition of operational rules and recommendations for transition towards homogeneous interoperability
- contribute to reporting

TCF

- support to the definition of the architecture governance and rules of interoperability
- liaison with WP 5300
- contribute to reporting

Deliverables			
Reference	Name	Brief description	Month of delivery
D4500.1	Standards for G-MOSAIC security scenarios	Analysis of relevant standards to be adopted in G-MOSAIC	T0+6 T0+15 T0+30
D4500.2	Interoperability analysis of Service Architecture for Security	Analysis of architectural and interoperability standards to be adopted in G-MOSAIC for the Service Architecture design.	T0 + 6 T0 + 12 T0 + 24

B.6.5 Modelling GMES Security Sustainability (WP5000)

The objective of the herewith WP is:

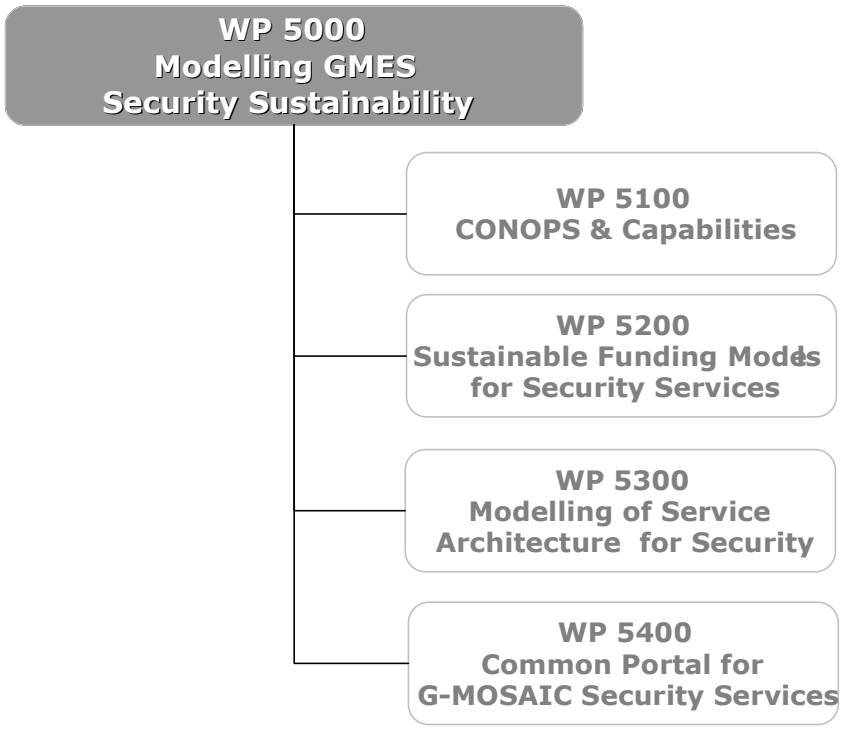
- In the short-term, to demonstrate the delivery feasibility of some G-MOSAIC security sustainable services throughout a common portal for the common use and/or exchanges of data, products and core services.
- in the long-term and in the GMES global security perspectives, to establish a realistic roadmap towards the GMES security sustainability target, taking into account pre-operational and operational capabilities and assets, interoperability and dual-use issues, as well as economic, organisational and operational aspects.

Attention will be paid to Dual Use, in line with the goals already achieved in the precursor security project LIMES and in national programmes.

A specific approach will also address the information security to face any threats to systems themselves and ensure system protection in terms of Availability (resources and data available at any time they are required), Integrity (resources and data can be modified or deleted only by the owner) and Confidentiality.

The WP activities include:

- the definition of the relevant architecture for the GMES security services delivery compatible with the "users needs vs market" maturity and economic models
- the analysis and modelling of the GMES Security environment: Economic aspects, Concept of operations, contract, quality of security services delivery, interoperability and dual use;
- the rapid design and prototyping of the "common gateway" necessary to G-MOSAIC service scenarios deployment and operations
- the architecture evaluation and the roadmap elaboration of GMES security environment



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	26	27	28	29	30	32	33	34	35	36	37	39	40	Total
		TPZ	INFOTERRA FRANCE	TCF	DLR	INDRA ESPACIO	GMV	EUSC	JRC	SRC	IAI	FRS	SCOR	TAS-I	TAS-F	AN	Astrium SAS	Infoterra UK	ITD	TUBAF	TNO	IMAA	UNIBAS	EUROSENSE	LUISS	SKF	IST	JR	PLUS	PLANETEK	CRPSM	GISAT	KCL	SYNESYS	Adelphi	SISTEMATICA	Swisspeace	
5000	5100	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	23,9	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	2,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	26,4
	5200	0,0	0,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	6,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	10,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	18,4
	5300	0,0	0,0	37,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	7,2	0,0	0,0	0,0	44,3
	5400	22,0	0,0	7,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	8,5	0,0	0,0	0,0	5,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	7,7	0,0	0,0	0,0	0,0	0,0	10,3	0,0	61,0
	5000 Total	22,0	0,0	46,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	32,3	0,0	6,1	0,0	5,6	0,0	0,0	0,0	0,0	0,0	0,0	10,3	0,0	0,0	0,0	0,0	10,2	0,0	0,0	0,0	7,2	0,0	10,3	0,0	150,1

Table B-26: Staff effort for WP5000

Work package n°	5100	Start date or starting event:	T0	
Wok package title:	**CONOPS & Capabilities**			
WP leader	Thales Alenia IT			
Activity type	RTD			
Participant ID	Thales Alenia IT	PLANETEK		

Objectives
The objective of this WP 5100 is to establish the "operational concepts and scenarios" for the security GMES services in terms of:

- description of the operational organisations and processes in terms of operational activities, information exchange, capabilities, use cases, and stakeholders with respect to the threats analysis and dual use concepts.
- analysing non-GMES systems and facilities involved in the processes.

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Description of work
The activities of this WP 5100 start with the analysis of operational concepts and scenarios in terms of:

- Operational organisation description:
  Mapping of identified actors and stakeholders (inputs from WP4200) with the activities and the concepts of use.
  Definition of the management organisation, the collaboration scheme, the cooperation, the communities of interest.
  Relation between roles and actors.
- Operational workflows description based on the actors, the doctrines and operational rules, the processes, the activities, and the operational data.
- Operational needs description in a dual use context:
  Fulfilling several (and sometime contrasting) needs from different user typologies, (Defense, civilian institutional, commercial) but all coexistent in the same service framework
  Granting confidentiality, integrity, and availability of the information in any of its possible statuses (i.e. whether it is stored, or transmitted, or being used by applications) in two different domain contexts.
- Operational activity modelling: formal representation of the organisations, workflows and use cases within Architecture Framework tools (e.g. Tele-logic/System Architect).
- Operational concept description of non-GMES systems and facilities involved
  Extension of the flexible accessing schema to information from interoperable distributed sources worldwide, encompassing relevant legacy system designed/developed outside common EU GMES strategy and framework.
  Inclusion of non-GMES systems and facilities involved in the processes will be critically analysed in view of synergies to be created between accessible national system (operational) and medium and long term EU GMES security evolving strategy.
- Threats analysis: This analysis identifies the vulnerability of the architecture usage regarding mainly security, safety, human factors, and environmental conditions.

After the analysis of operational concepts and scenarios, the WP 5100 will perform an extensive threats analysis. In particular, the methodology which will be used is derived from Information Security standards and expertise, and extended/customized as necessary to assess systems geographically distributed, threats and security measures of a complex system.
Threat analysis will be based on a risk model aimed to predict the effectiveness of security measures in a complex environment such as the GMES security context, and the residual risks factors.

- The Risk Model considers
  Threat Level as a function of the attack capability, of the exposition of the system assets, relevance (ranking) of assets (physical and data)
  Assets exposed to threats : Confidentiality, Integrity, Availability, of data and infrastructures;

- Quantitative Risk Analysis Model developed in two forms, due to complexity:
  Technology Risk Analysis, risk evaluation of all the Security measures (technical, physical, organization) provided by the Security system;
- Geographic Asset based Risk Analysis, considering the geographical distribution of Security system, and political risk factors to establish the Threats scenario.

Note:
The outputs of this WP shall be formalised according to templates provided by the WP 5300 in order to directly integrate these outputs into the architecture models.

Subtasks

T5110 Analysis of operational concepts and scenarios
The task will do an analysis of the operational processes in terms of operational activities, information exchange, capabilities, use cases, and stakeholders. Specific attention will be put on dual use concept in order to fulfil needs from different users (defence, civilian etc.) and to grant confidentiality, availability and integrity of the information.

T5120 Analysis of threats
The task will perform a threat analysis based on a risk model aimed to predict the effectiveness of security measures in a complex environment such as the GMES security context.

Role of participants

Thales Alenia IT
Thales Alenia IT will lead all the activities defined in this WP focalising their contribution in the dual use context and threats analysis

PLANETEK
PLANETEK shall contribute to the operational organisations description taken into account the outcomes of the tasks defined in WP4200 "Cross cutting analysis & stakeholders identification" and focusing on inclusion of non-GMES systems and facilities involved in the processes.

Deliverables			
Reference	Name	Brief description	Month of delivery
D5100.1	G-Mosaic Operational Concept Document	Analysis of the operational processes: operational activities, information exchange, capabilities, dual use concept, confidentiality, availability and integrity of the information.	T0 + 06 T0 + 18

Work package n°	5200		Start date or starting event:		T0+06			
Wok package title:	**Sustainable economic models for security services**							
WP leader	LUISS							
Activity type	RTD							
Participant ID	LUISS	AN	TCF					

Objectives

The relevance of GMES in enhancing public utilities and social welfare has been extensively testified and accepted. This is particularly valid for those services that infer security issues, in which the topic of dual use of the satellite technology takes a more tangible and practical role. Nonetheless, questions remain open about the economic sustainability of these services. More in particular, the economics and the interrelation of different stakeholders need to be clarified.

Consistently, the objectives of this WP are:

- To provide a clear and consistent understanding of all the main economic issues around the GMES Security services in general and the G-MOSAIC applications in particular, starting from the economic characterization of the key categories of stakeholders involved, by analyzing inputs received from WP4200, WP5100 and WP6100.
- Secondly, the study will be conducted on the cost models for infrastructure investments as well as operational costs, thus including the phases related to the services production and delivery. Moreover, in order to establish the sustainability of G-MOSAIC services, funding sources and ancillary potential revenues will be identified. Those values will also feed a more in depth analysis targeted at determining long-term economic scenarios for both infrastructure and operational costs. Additionally, and to ensure a practical approach for G-MOSAIC, some recommendations about organisational and funding structures will be made, taking also into consideration the dual use of this satellite technology.

Description of work

To reach the above mentioned objectives, the research activities will start with a careful analysis of the value chain connected to the production and distribution of G-MOSAIC services. In particular, the entire chain of activities and actors playing in the field will be taken into analysis: from the infrastructure (existing, planned, required), through data and security services provision, to the end users and other related institutional organisations which may have a stake.
The keys-in of other GMES projects, such as BOSS4GMES (transverse GMES economic issues as well similarities and differences with FTS Risk and Emergencies), will be an important input, to be studied with existing experiences of sustainable GMES services to highlight common concepts and differences in the case of Security Services.
The experience developed thanks to previous research will be exploited in a consistent model of analysis. This is useful for setting a forecasting approach, which could shed the light on the prospective scenarios for the sustainability of G-MOSAIC services. To do so, a deep understanding of the operational linkage between stakeholders is needed. In fact, the reconstruction of the value chain, combined with the results of WP5100 on the operational workflows and WP6100 on the direct interface with the users, will lay the basis for the understanding of main costs sources with respect both to the investment and operational activities. More specifically, the analysis will focus on each single component of the overall industry involved in GMES Security, in order to identify the activities where value creation is emphasized. Employing a value-based approach would give important hints in defining the operational aspects of the services provisioning. Moreover, in their turn, these costs drivers will be used in financial forecasts to develop a sustainable economic scenario in the G-MOSAIC context in particular and GMES Security services in general. An iterative approach will sustain the modelling efforts, with the aim of combining the economic constraints with the operational technicalities, as well as with user requirements and stakeholder issues.
In developing these economic models, particular emphasis will be placed on the impact of dual use from both a funding and operational costs point of view.

In detail the WP will be articulated through the following activities:

- Analysis, from an economic standpoint, of the stakeholders involved in GMES security services (exploitation of inputs from WPs 4200, 5100 and 6100), with the aim of identifying the characteristics of each group of stakeholders and their role in determining the value drivers of services provisioning;
- Identification of the procurement schemes in services provision, in order to isolate cost determinants and prospective revenue sources;
- Recognition of cost drivers for infrastructure architecture (investment costs), which should be considered as sunk costs in the economic models;
- Recognition of cost drivers for services production and delivery (operational costs), which will be detected emphasizing the potentiality of efficiency driven cost reduction;
- Identification of funding sources and potential ancillary revenues, which may come from different stakeholders or users, both public bodies and private actors;
- Design of economic scenarios for both investment and operational costs; through a scenario based analysis which can allow identifying the plus-minus of the alternative choices in developing and delivering the services.

Subtasks
This WP is organised in three tasks described in the following.

T5210 State of the art analysis
This investigation will be performed on the role of stakeholders and users' needs stemming from previous research. Moreover this task will do a deep review of main outcomes from other WPs involved on similar topics like WPs from WP4000 and WP6000. Output of this task is D5200.1.

T5220 Data collection on costs and funding
This task will collect data on costs and funding by analysing investment and operational costs together with funding and potential revenues. Outputs of this task is D5200.1

T5230 Development of an economic model
This task is in charge of the elaboration of an economic scenario and some guidelines for policy makers. Outputs of this task is D5200.1

Role of participants
LUISS
As coordinator of this WP, LUISS will coordinate and organize the work, aiming at maximizing the outcome in terms of clear reports and useful indications for the other partners. As far as LUISS specific contribution is concerned, it will be mainly addressed to the costs determination in order to develop the economic sustainable model for G-Mosaic activities. This means to contextualize infrastructure and operational costs in an aggregated deliverable useful to define some possible scenarios on which some sensitivity analysis will be conducted. LUISS will also carefully design the scenario analysis, in order to ensure a great interrelation with the partners and the other stakeholder, thus feeding the model with insightful and respectful knowledge on the matter. The sensitivity analysis will also reflect LUISS' skills in economic modelling and strategic management.

AN
Arsenale Novissimo work will be focused on the analysis of the users and stakeholders for GMES security services. Moreover, it will be involved with the recognition of cost drivers for both infrastructure and operational activities and associated to the development of economic scenarios. This work will take benefits from the synergies with the AN role in WP6100.

TCF
As WP5000 leader TCF will assure the proper finalisation of the work by complementing the experience of the other two partners with a more oriented "industrial" point of view.

Deliverables			
Reference	Name	Brief description	Month of delivery
D5200.1	Report on scenario analysis of sustainable economic model and cost analysis	State of the art, cost and funding scenarios analysis, development of an economic model	T0+9 T0+24 T0+33

Work package n°	5300	Start date or starting event:	T0+06				
Wok package title:	**Modelling of Service Architecture for Security**						
WP leader	TCF						
Activity type	RTD						
Participant ID	TCF	SYNESYS					

Objectives
The objective of this WP is to:

- Take inputs from WP5100, WP5200, WP6300 and define requirements for the whole architecture model.
- Deal with interoperability (inputs from WP4500) vs. security (inputs from WP5100) issues. In particular for what concerns interfaces with defence, security entities and taking into account specific security issues like confidentiality of information etc.
- Define, starting from G-MOSAIC practical experiences and analyses, a basic and alternative GMES security services architecture models relevant to security delivery and deployment models according to identified market segments and their evolution. Architecture models will include the description of horizontal services and the associated concept of employment to support geo-intelligence operations.

Description of work
This WP shall define the methods and rules to choose and customize architecture models, via architecture meta-model, so as to maintain 'by construction' consistency checks on security architecture models.
This WP shall include the specification and performing of an open modelling environment that will host the means and resources dedicated to economic and technical evaluations of GMES security services sustainability solutions.

This modelling environment will have:

- Economic and operational purposes: economic aspects shall be estimated according to transition plans from the initial architecture of GMES security services to the target architecture.
- An organisation and interoperability policies (processes, plans): organisation shall include operational teams for architecture description, and expertise teams for support and surveys for solution efficiency.
- Resources, possibly distributed over several sites and centres.

This modelling environment shall host:

- Models for description, characterisation and evaluation,
- A basic toolset and mechanisms to enrich it: tools allows for capture, analysis (simulation), comparison of solutions, and documentation of results as well as rationales for recommendations.

The modelling tasks are to:

- Describe and evaluate alternatives of operational solutions. Target architecture is characterized by a milestone (e.g. 2015), expected revenues, and business segment models at that milestone. Transition takes into account budget availability vs. market maturity and incremental acquisition costs.
- Describe and evaluate alternatives of architectures to support target operational solutions. A specific emphasis will be put on the identification, modelling and evaluation of horizontal services relevant to geo-intelligence (like data mining). Moreover, architecture descriptions shall include a view on transition plan from initial version to a target version, according to costs.
- Provide repositories to store economic and operational models (customers, users, service contracts), and funding models to sustain GMES security services.

- Provide configuration management facilities to govern transition plans towards target economic models.

Subtasks

T5510 Requirements on the environment for Architectures Description and Evaluation of GMES Security Services

This task identifies the key requirements for description and evaluation of GMES security service architectures, from multiple viewpoints: economic, organisational, economic, functional and quality. architecture views are adapted from well known architecture frameworks (e.g. Zachman AF, NATO AF) to include services views, and quality of services views. The WP identifies also management views allowing to describe the service management workflows and constraints that ensure the respect of the SLAs and SLS that will be issued by WP 6300.

T5520 Formalisation of interoperability constraints in architecture description views

This task relies on outputs of WP 4500 to formalise the interoperability constraints (standards and models) in the description of alternatives of architectures, in order to ensure that will interoperability is part of GMES security services evaluation criteria. Starting from architecture views outputs from WP5510, activities of WP5520 shall issue specific interoperability views, or identify interoperability attributes to add to the former views, or both.

T5530 Integrating quality of service in GMES security architecture descriptions

- Customisation of architecture views to integrate:
  Quality of service parameters.
  Services evolution properties
  Services interchange properties
  Services maintenance properties
- Definition and implementation of consistency checks regarding service and quality of service models.
- Integration of economic data models in the environment for architecture description.

T5540 methodology for architecture description and evaluation

Methodology for architecture description and evaluation of security services: stakes, constraints process, organisation, tools. This WP will include tool customisation to integrate GMES security economic models in architecture descriptions and evaluations.

Role of participants

TCF

TCF will define the environment for architecture description, and the methodology allowing to build a roadmap to target GMES security services architecture taking into account economic, operational and technical the viewpoints. The methodology includes:

- An hybrid process (bottom-up and top down) to define target security services architecture integrating legacy and interoperability constraints;
- A technique for architecture view selection (starting from existing frameworks) and justification
- The definition of consistency checks between selected views
- A method for multi-criteria evaluation of AoA (alternatives of architectures).
- Tool support for description, checking and evaluation of AoA (Alternatives of Architectures).

SYNESYS

SYNESYS will perform the following activities:

- Customisation of architecture views to integrate:
  Interoperability,
  Quality of service parameters.
  Services evolution properties

Services interchange properties
Services maintenance properties

- Definition and implementation of consistency checks regarding service and quality of service models.
- Integration of economic data models in the environment for architecture description.

SYNESYS will also contribute to the reviews of GMES security service architecture descriptions.

Deliverables			
Reference	Name	Brief description	Month of delivery
D5300.1	Modelling for service Architecture for Security	key requirements for GMES security service architectures; interoperability constraints; quality of service; Methodology for architecture description and evaluation of security services.	T0+12 T0+18

Work package n°	5400	Start date or starting event:		T0			
Wok package title:	**Common portal for G-MOSAIC security services**						
WP leader	TPZ						
Activity type	RTD						
Participant ID	TPZ	Thales Alenia FR	TCF	Infoterra UK	PLANETEK	SISTEMATICA	Thales Alenia IT

Objectives

The main objective of this WP is to develop a prototype platform for the integration of the different service cases in a service network. This objective will be achieved during the project by considering also the analysis of requirements coming from all the users engaged during the project.
In particular this prototype will try to implement some security-related concepts like information confidentiality and sensitiveness as well as cooperative mapping functions that can be used by decision makers to enhance their view of crises.

During the first cycle G-MOSAIC will be based on a distributed service network with specific functionalities (integration of in-situ data and integration of non-EO data like multi media etc.). Moreover, the first prototype will deliver a preliminary access portal with the aim of giving an integrated view of the service cases.

During the second phase the G-MOSAIC platform will be a full prototype to be used by the service network to deliver their services with a unified interface to the users. Moreover, in this second cycle the portal will have the objective to integrate security concepts from the architecture design (WP 5300).

Moreover, the development will be carried out with the following main objectives:

- Analyse experiences coming from FP6 projects (e.g. OSIRIS, WIN, BOSS4GMES, ORCHESTRA, OASIS, Humboldt,) and of the current design of other GMES fast track service networks (ex. Emergency, User Implementation Group)
- Produce a prototype implementation of a platform addressing some of the concepts described in WP4500 to be tested during the services deployment.
- Support the test cases delivery and assess the platform prototype (e.g. statistics on usage of the service and on level of participation, feedbacks on the functionalities provided by the platform). In fact, the portal will also be used as an instrument to stimulate the feedbacks from users and experts.

Description of work

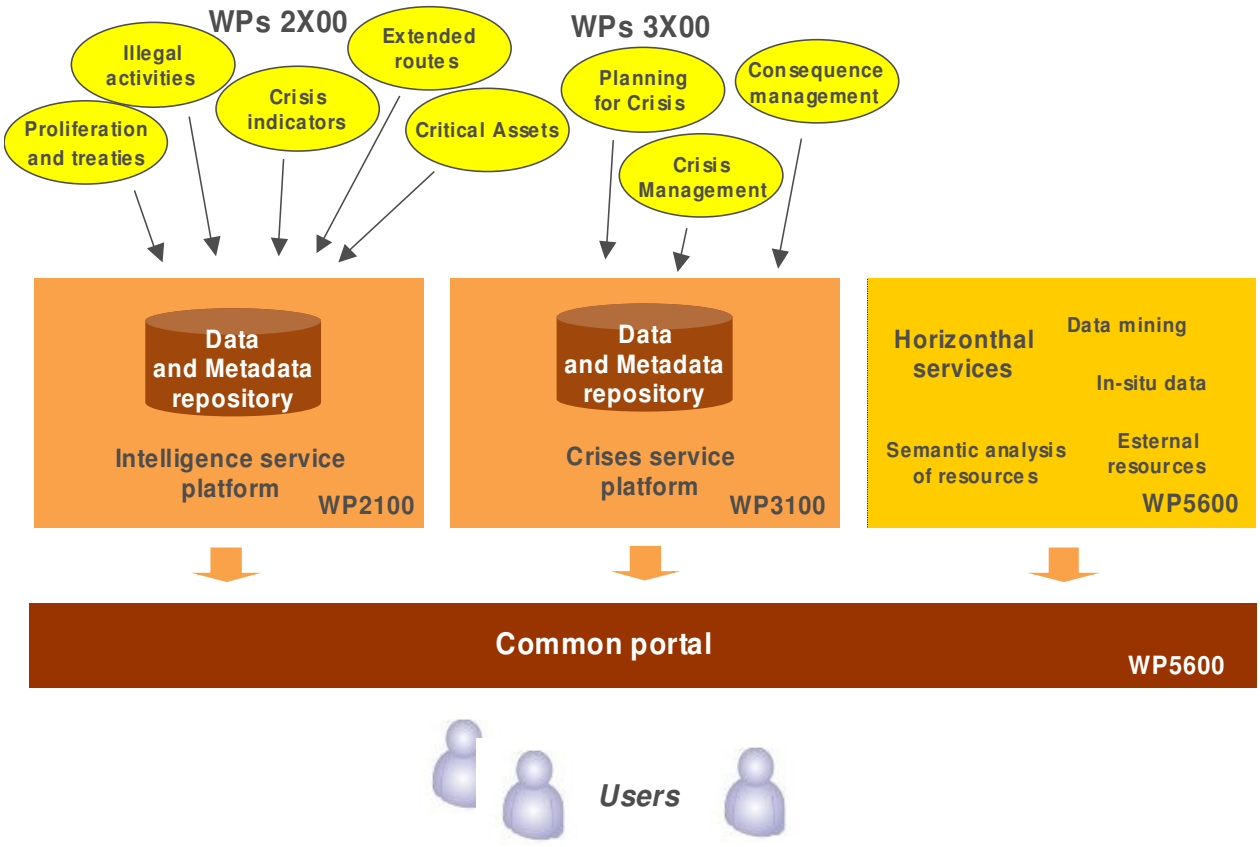
The expected output is a preoperational portal that relies on the existing service platforms. This portal will represent an integration layer for the different services and that will act as a prototype service network for the sustainability of GMES security services in an INSPIRE like model. In this sense, some of the functionalities provided can be foreseen, among them:

- A Web-GIS interface with a general presentation of the test cases with information like basic description, status, point of contacts etc.
- Demonstration of prototype implementation on issues related to confidentiality and sensitiveness of data
- Functionalities that allow the user to share geo-located notes as inputs in the geo-intelligence process
- Possibility to integrate in a flexible way external resources (External Web-GIS, EUSC Google-like facilities, in-situ systems, etc.)
- A data-mining interface allowing search and retrieve of multi media information from word / text queries or by selecting a geographical zone (lat/lon WGS84),

- Basic services (messages, e-mail, contacts, wiky etc.) and tools for the monitoring of the portal activity of each test case

Moreover, the common portal will act as an integration layer with the objective of integrating selected security concepts from the architecture WP (WP5300) with particular attention on sensitiveness and confidentiality of service delivery. This first pre-operational experience of integration will provide an important feedback for other WPs in WP5000 in the perspective of a future sustainable architecture for GMES security services.

In the following figure a first logical architecture of the G-MOSAIC network is shown. The portal will represent an integration layer for the different test cases by giving to the users a selected and constrained access to specific test cases contents based on customised profiles.
The common portal will rely on resources coming from the service platforms (e.g. as OGC services) and on the horizontal functionalities that are developed inside the common portal framework (some examples are given above). In this sense each service platform can be thought as a preoperational service network which provides contents to the common portal by using service providers' facilities. What is necessary to do in this WP is the integration with the common portal also with respect to security issues. So, these platforms will also have to provide horizontal services (depending on the requirements analysis) like: Data and services catalogue; customised interface at user premises; Authorization and authentication framework.



It is important to stress that this WP will maximise reuse of components developed in other similar projects like OSIRIS, DUMA, WIN, BOSS4GMES, Humboldt and in the forthcoming Emergency service network. In this sense, the reuse is guaranteed by the presence of partners from these projects.
In particular, for what concerns dual-use concepts, the integration and customisation of DUMA (Dual Use and Multilevel Access) will allow to improve the policies for information filtering that are currently affected by the following limitations. In fact, DUMA is conceived as an innovative architectural concept based on a multi-agent system which will implement the services security.

Subtasks

T5610 Implementation of the common portal V1
This task will develop a preliminary access portal with the aim of giving an integrated view of the services on the service platforms. This activity is based on the analysis of the requirements and of the architectures from WP5000. The work starts from the analysis of other experiences (e.g. Emergency) with respect to GMES Security case taking into account of the issues (operational concepts etc.) coming from WP5000. Moreover, this subtask will define basic requirements as well as requirements on selected concepts on issues related to confidentiality and sensitiveness of data. Finally, the subtask will implement the V1 of the prototype as a first platform for service delivery.

T5620 Integration of service platforms (coming from WP2100 and WP3100)
This task will ensure integration of the service platforms in the common portal V1. The integration will be made by using standard technologies (OGC, INSPIRE, OASIS, W3C etc.) and will consider security aspects developed in WP5400.

T5630 Implementation of the platform V2
This task will develop a full prototype to be used by the service network to deliver their services with a unified interface to the users. Moreover, in this second cycle the portal will have the objective to integrate security concepts from the architecture design. This activity is based on the analysis of the feedback coming from appraisal in the first cycle (including feedbacks on platform implementation). The work consists in a refinement of the requirements and functionalities on the basis of the feedbacks (in terms of service network requirements) coming from each test case run. Then it will implement the full version of the prototype for the service delivery of the second phase.

T5640 Second cycle iteration on service platforms integration in the common portal V2.
Depending on changes driven by the V2 platform, this task will ensure the integration of the service platforms.

T5650 Technical support during operations
This task has the objective of maintaining a point of contact for the G-MOSAIC service delivery through the common portal for G-MOSAIC security services. This will ensure a continuous support and monitoring of the information flows between actors in the G-MOSAIC projects.

T5660 Evaluation and feedback analysis
During second appraisal phase, this task will analyse results from platform statistics both in terms of platform assessments and in terms of test cases assessment through web statistics. The evaluation report will be made considering issues coming from WP5000 in order to represent a first practical experience of security service delivery to the user. This report will be used by other WPs in WP5000 as input for the analysis of recommendations and guidelines for the future architecture for GMES security services.

Role of participants
TPZ
TPZ will be in charge of the following activities:
- Responsible for coordination and main contributor of T5610 and T5630(Common portal V1)
- Contributor to T5620 and T5640 (crises platform integration)
- Contributor to T5660 (feedback on common portal, crises platform integration)
- Responsible for T5660 (maintain a point of contact for the G-MOSAIC service delivery through the common portal for G-MOSAIC security services)

Thales Alenia IT
will be in charge of the following activities:
- Contributor to T5610 and T5630 (DUMA improvement and adaptation in the G-MOSAIC environment)

Thales Alenia FR
- Contributor to T5610 and T5630
- Contributor to T5660 (feedback on standardisation issues)

TCF
will be in charge of the following activities:
- Responsible for coordination and main contributor of T5660 (evaluation of common portal results in an architectural perspective)
- Contributor to T5610 and T5630 (data-mining tool)
-

PLANETEK
will be in charge of the following activities:
- Contributor to T5620 and T5640 (intelligence platform integration)
- Contributor to T5660 (feedback on service platforms)

Infoterra UK
will be responsible for the following activities:
- Contributor to T5610, T5630 (data repository, data access standardization and customization)
- Contributor to T5620 and T5640 (intelligence platform integration)
- Contributor to T5660 (feedback on service platforms)

SISTEMATICA
will be in charge of the following activities:
- Contributor to T5610 and T5630 (integration of tools for the status and performance monitoring of the portal and reporting functions on data access)

Deliverables

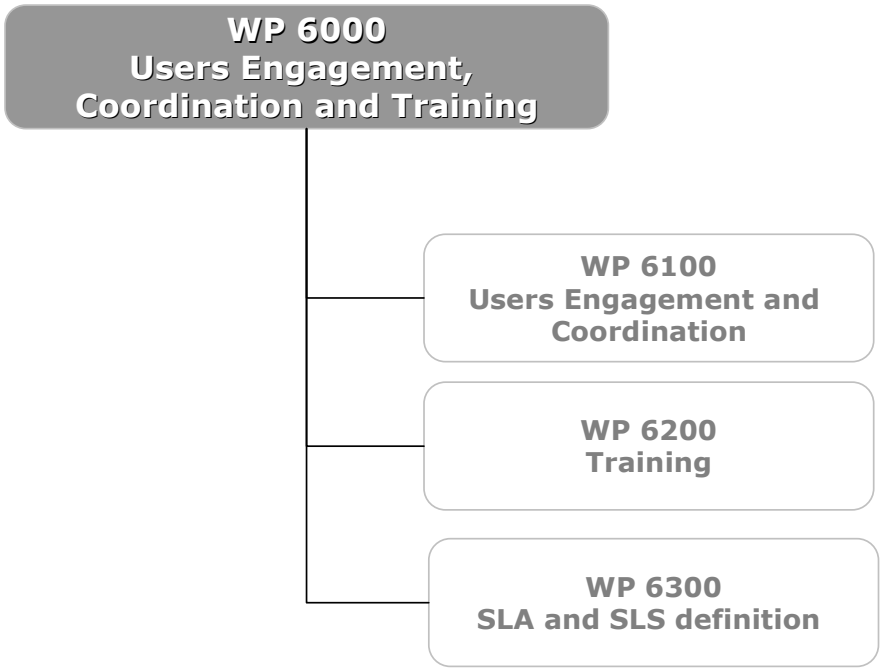
Reference	Name	Brief description	Month of delivery
D5400.1	Operational Common Portal Specification	Specification and design of the common portal	T0+03
D5400.2	Operational Common Portal - Implementation plan	Methodology and planning for common portal implementation, integration of the service platforms, operational support and validation (evaluation and feedback analysis)	T0+03 T0+21
D5400.3	Operational Common Portal	Prototype of the common portal for G-MOSAIC security services	T0+09 T0+24
D5400.4	Operational common portal and service platform guide	Operational manual supporting the use of the platform for the demonstrations.	T0+09 T0+24
D5400.5	Platform Validation and Appraisal report	The appraisal on the common portal is issued on the basis of the feedbacks collected at the end of the operational phases	T0+21 T0+33

B.6.6 Users Engagement, Coordination and Training (WP6000)

The objective of WP 6000 is to coordinate the interface between the project activities, results, achievements and the end-user community. This includes training the users in getting the best benefit from geo-spatial information services and related products.

The WP specific tasks include:

- stimulate and maintain a constructive dialogue between the project and the end-user community through the organisation of bi-lateral, multilateral interviews and information seminars with user's representatives and, in particular, with the core users group;
- select key information to be disseminated to the users and liaise with the dissemination activities work package (WP7000). This work will be performed in coordination with project coordinator for all matter related to the dissemination of results achieved by the project to user's community trough brochures, and in particular via the G-MOSAIC web site;
- perform the users training activities devoted to raise awareness on technical and operational characteristics of G-MOSAIC services in view of an operational exploitation.



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	26	27	28	29	30	32	33	34	35	36	37	39	40	Total
		TPZ	INFOTERRA FRANCE	TCF	DLR	INDRA ESPACIO	GMV	EUSC	JRC	SRC	IAI	FRS	SCOR	TAS-I	TAS-F	AN	Astrium SAS	Infoterra UK	ITD	TUBAF	TNO	IMAA	UNIBAS	EUROSENSE	LUISS	SKF	IST	JR	PLUS	PLANETEK	CRPSM	GISAT	KCL	SYNESYS	Adelphi	SISTEMATICA	Swisspeace	
6000	6100	0	0	0,0	0,0	0,0	0,0	16,0	5,4	9,2	0,0	0,0	0,0	0,0	0,0	6,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	36,6
	6200	0	0	0,0	0,0	0,0	0,0	8,5	5,7	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	14,2
	6300	6,5	0,0	3,9	0,0	7,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	17,7
	6000 Total	6,5	0,0	3,9	0,0	7,4	0,0	24,5	11,0	9,2	0,0	0,0	0,0	0,0	0,0	6,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	68,5

Table B-27: Staff effort for WP6000

Work package n°	6100		Start date or starting event:		T0			
Wok package title:	**Users Engagement and Coordination**							
WP leader	EUSC							
Activity type	RTD							
Participant ID	EUSC	JRC	SRC	AN				

Objectives
The objective of this WP is to stimulate and maintain a constructive dialogue between the G-MOSAIC project and the end-user community through the organisation of bi-lateral, multilateral interviews and information seminars with users' representatives (User Working Groups), in particular with the core users group. This WP provides guidance to the dissemination strategy and action plan (WP7000) for G-MOSAIC promotion to users. This WP is also coordinated with training actions (detailed in WP6200).

Description of work
Within the context of G-MOSAIC the direct involvement and integration of the users, and in particular the core users SITCEN, EUMS and DG-RELEX in the activities of the project is critical. WP6100 will therefore be the non-technical interface to the user community in support of Consortium Management.
Users need to gain a global understanding of G-MOSAIC activities to take the best benefit of the services developed. Users associated in a service case may discover that they can also take benefit from another service case therefore they need to be fully informed on all project activities.
Users also need to be provided with the opportunity to exchange views with each other in order to give a coordinated feedback on service response and also to develop synergies in an inter pillar spirit and to identify common needs and interests.

The task will encompass a compilation of arguments to be presented to the users in order to raise awareness of G-MOSAIC services (within the general context of GMES Security Services), to promote acceptance of these services, and ensure maximum user engagement in G-MOSAIC. An audit of existing communication on GMES Security Services will also be performed.

Arguments in favour of G-MOSAIC Security services will be collected and screened against the users needs, and an in-depth understanding of the perception of GMES among potential users of Security Services will be developed.
This will be achieved through a mix of:

- Face-to-face interviews (with key G-MOSAIC participants and a representative sample of users, stakeholders and decision-makers to be recommended by consortium members and by the Commission services) The WP6100 contributors intend to deepen relations with some key end-users, taking advantage of their high level contacts in Italian, French and Spanish administrations acquired through experience in past projects. The effectiveness of this effort will be ensured by individual interviews, whose reports will fill and complete general assessments emerged in collective workshops.
- User Workshops (seminars), where all users will be invited, in order to promote dialogue (between the users themselves, as well as between the users and the G-MOSAIC Consortium) and provide a forum for the presentation of G-MOSAIC services. Three such User Workshops are foreseen (one at the EUSC, one at the JRC and one at the SRC). desk-work and academic research.

Understanding the benefits of G-MOSAIC Services against user's requirements will be an unavoidable step for the user engagement team to build up a clear dissemination and user involvement strategy for G-MOSAIC services, thus overcoming fragmented communication of technical nature as it is commonly provided by experts and dedicated to experts. The emphasis will be placed on the point of view of the targets of the dissemination and user engagement efforts, rather than on the standpoint of the G-MOSAIC consortium.
Screening of existing messages and communication tools sent out on GMES Security Services by many different actors will be a further goal of this first task.

To this end, the WP6100 team will collect as much as possible existing materials produced by previous projects (such as ASTRO+, GMOSS, MARISS and LIMES) as well as documentation on communication activities carried out.

Results of the seminars will be disseminated through WP7000 using the most appropriate tools such as brochures, and in particular via the G-MOSAIC web site.

The users will be engaged following 3 phases.

Specification Phase

- A phase of requirements collection is foreseen, during this phase. A key role will be played by JRC and EUSC which have a consolidated record of geo-spatial info provision to EU institutions. Main information to be collected in this phase is related to the scenario definition (e.g. area of interest, time span, object of interest…) and relevant service parameters required (timeliness, formats, dissemination means…).

"Step by step" Delivery Phase

- After 9 months, the delivery of services will start with the following aims:
  - ✓ gain the trust of the users by providing geo-spatial info for their daily activities
  - ✓ continuously collect user feedbacks and tune the services in accordance ("develop while delivering" approach)

Validation Phase

- User will be asked to provide feedbacks on:
  - ✓ is the service fully integrated in the user workflow (try to define a "measure" for this)?
  - ✓ does the service support operational user workflow (again to be "quantified)?
  - ✓ usability of services
  - ✓ performances of services (relative to users needs)

This WP should first identify actual users to be involved in each of the service trials proposed, then should collect indication of the responsibilities of these users for which the proposed services are relevant and finally should stimulate the user participation supporting the user involvement inside GMOSAIC WP processes such as:

- SLA definition (see WP6300)
- Validation constraints definitions (see WP2000, WP3000)
- Scenario definition (see WP2100, WP3100, WP4200),

This WP will provide support to the WP1210, Technical Coordination for what concern the organization of the User Advisory Board; in particular for the member's engagement and for harmonies the tasks of the UAB with the WP6100 phases approach.

Role of participants

EUSC
Coordinating all, writing user engagement plans, organizing third workshop and contributing to the organization of all other workshops.
Responsible for D6100.1, D6100.3. Contribute to D6100.2

AN
Contributing to user engagement plans, organizing and conducting bi-lateral interviews, gathering and classifying arguments, analyzing perceptions of GMES Security Services among the user community.
Contribute to all WP reports. Moreover AN will assure the liaison with their activities carried out in the WP5200 (Sust. Funding Models for security services) and WP7000 (Dissemination).

JRC
Contributing to user engagement plans, organizing second workshop and contributing to the organization of all other workshops.

Responsible for issuing contribute to D6100.2 , D6100.3

SRC
Contributing to user engagement plans, organizing first workshop and contributing to the organization of all other workshops.
Responsible for D6100.2 and contribute ,D6100.3

Deliverables

Reference	Name	Brief description	Month of delivery
D6100.1	User Engagement Plan	Short document (2 pages) describing the planning of activities for users engagement during first phase, i.e. identification of the target users, definition of the objectives to be achieved, identification of the approach to be adopted, identification of the material needed for supporting the above activities.	T0+03 T0+24
D6100.2	Report on user workshops	Summary report on the activities carried out during each User workshop, including minutes of the discussion, user's profile, analysis of the workshops outcomes for the forthcoming G-MOSAIC activities.	T0+9 T0+24 T0+33
D6100.3	G-MOSAIC User needs collection	Collection of User Needs	T0+3
D6100.4	G-MOSAIC SLA/SLS Collection	Collection of SLA/SLS	T0+9

Work package n°	6200		Start date or starting event:		T0+06			
Wok package title:	**Training**							
WP leader	EUSC							
Activity type	OTHER (Training)							
Participant ID	EUSC	JRC						

Objectives
The aim of the WP is to train user's representatives within G-MOSAIC to use to the best extent the services developed. This WP will also ensure that user's representatives will be able at a second stage to disseminate their specific knowledge within their community of users (training of trainers).

Description of work
EUSC will bring its training experience and its operational training infrastructure. This experience was gained with years of courses for image analysts and users. JRC will support WP activities with specific knowledge related to EC users needs in particular DG RELEX, JRC will also provide lectures during training courses.
Training will be open to all users of G-MOSAIC including the core users SITCEN, EUMS and DG-RELEX. First and second pillar users will be addressed.
New member states will also be trained, as required. Experience gained in ASTRO+ will be taken into account as well as already established contact with Polish authorities via the SRC.
Two main training sessions will be organized, one at the JRC and one at the EUSC. The dates of the main training sessions will be chosen in order that they will follow immediately seminars organized for user engagement (Users Workshops) in order to avoid waste of time and funds in travelling and to optimize the time requested from users.
The training sessions will take place before the beginning of the services cases deployment and will make use of training materials (e.g. manuals, presentations, rolling demo, etc) deriving from WP2000 and WP3000.

Role of participants

EUSC
Coordinating all, writing user training plan, organizing training sessions, organizing training material, hosting second training session. EUSC will be responsible for the WP reporting.

JRC
Contributing to user training plan, contributing to organizing training sessions, supporting production of training material /mainly deriving from WP2000 and WP3000), hosting first training session. JRC will contribute to WP reporting.

Deliverables

Reference	Name	Brief description	Month of delivery
D6200.1	Training plan and training assessment	a) an identification of the target audiences b) a definition of the objectives to be achieved by the training (e.g. improved capability to understand content of service, improved capability to use service, …) c) an identification of the approaches to be adopted (stand alone distance learning material, tele/video conferencing, series of lectures, dedicated workshops, etc) d) a specification of the materials required to support the required training objectives e) an allocation of roles and responsibilities for i. generation of training material	T0+09 T0+21 T0+30

		ii. organisation of the training sessions iii. participation in the training sessions f) a definition of review procedures to assess the effectiveness of the training activities conducted and the application of lessons learned to future training activity The subsequent issues of the plan will include the assessment of the training activities carried out in the previous period.	

Work package n°	6300		Start date or starting event:			T0		
Wok package title:	**SLA and SLS definition**							
WP leader	INDRA ESPACIO							
Activity type	RTD							
Participant ID	INDRA ESPACIO	TPZ	TCF					

Objectives
The objectives of this WP are to:

- Analyse the quality of services delivery (requirements for the users defined in WP2000 and WP3000) in terms of provided information quality, delivery time etc.
- Analyse the agreements on data/information sharing (by also considering INSPIRE context) with respect to the security domain

Description of work
This work-package shall define the required quality of services delivery (in terms of services contract between Users and Providers) to reach operational GMES security missions. The analysis shall be performed on two viewpoints:

- Operational: identify the quality requirements to sustain the operational activities
- Technical: identify the quality requirements necessary to support the architecture performance

The main activities are:

- Service level agreement (SLA) definition: template definition for the user contracts; but also contracts between –more generally– stakeholders.
- Service level specification (SLS): template definition for the specification at the architecture level of the contracts.
- Service Taxonomies: identification of Core services, Downstream services; per segment, per milieu, etc. this latest task would require inputs from the security services implementation taking place in WP2000&3000

Any due agreement with the user concerning aspects such as: service characteristics, service performances, the access to user proprietary data, level of security and confidentiality of data has to be set up in the SLA and SLS definition.

Subtasks
A 3-step approach will be undertaken to get SLA and SLS definitions agreed between End-Users and Services Providers.

<u>T6310 SLA and SLS templates draft definition</u>
A first SLA template draft (or several if it's the case) will be defined for user contracts or contracts between stakeholders (i.e.: Service Providers and Data Providers). This initial draft is the deliverable for this subtask and is the input for next step.
Special care must be taken into account in the case of service chains whose final quality depend on the sum of individual quality components such as:

- EO data (delivery time, frequency rate,…)
- Non-EO data (availability, obsolescence, level of detail,…)
- Building blocks constraints (false alarm detections, scalability…)

These parameters could impact the final QoS delivered by the Service Providers to the End-Users, and must be part of SLA and SLS templates.
The SLA and SLS templates draft definition should also ensure access to required data streams owned by the users.

At the end of this subtask the first issue of D6300.1 and D6300.2 will be delivered

T6320 Getting End-Users and Service Providers feedbacks
Generally speaking, the stakeholder's suggestions to the proposed drafts are a key point to get a final agreed SLA and SLS templates. This subtask shall collect, analyse and discus all the requirements received from stakeholders. Some work must to be done if punctual conflicts on SLA and SLS specifications arise between different stakeholders interest. A balance will be pursued to reach final agreements.
The results of this subtask will be as input to T6330

T6330 SLA and SLS agreed templates
On the basis of the proposed templates, stakeholder's feedbacks and final agreements, the final templates shall be built up. They are the D6300.1 "G-MOSAIC SLA template definition" and D6300.2 "G-MOSAIC SLS template definition".
At the end of this subtask the finalized version of D6300.1 and D6300.2 will be delivered

Role of participants
INDRA ESPACIO
INDRA ESPACIO will be the main coordinator of this WP, compiling and organizing the contributions of the partners in the different subtasks and keeping controlled versions of all deliverables.
INDRA ESPACIO will contribute to SLS template definition by identifying common quality requirements from both operational and technical points of view applicable to each G-MOSAIC security service.
As an example: in service chains dealing with thematic mapping at a given scale, quality indicators will be described to be filled in the SLS templates to measure positional or thematic accuracy for the delivered product.

TPZ
TPZ contribution is focused on the SLA and SLS definition, concerning those Services supporting Crisis Management Operations; based on User experiences and requirements, and on the nature of the specific services, the most suitable model for SLAs to be agreed between Service Providers and End-User will be defined and specified, in terms of level of service required, Acceptability thresholds for ordering, delivery, reliability, Terms of access, Contractual model.

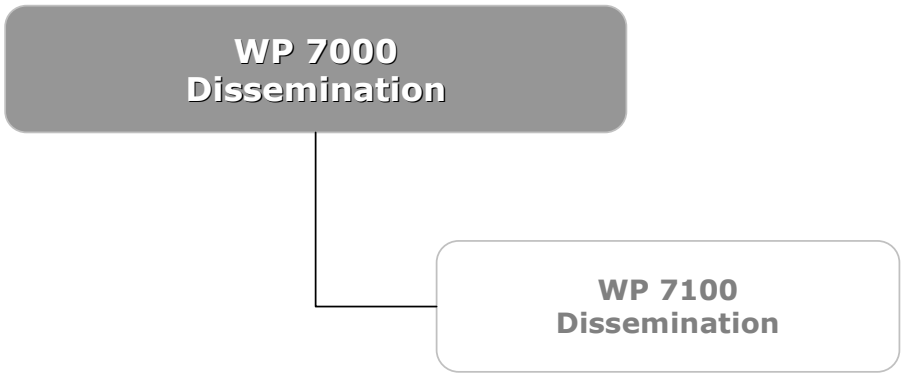
TCF
TCF contribution is focused on services taxonomies and formalisation according to templates provided by in order to directly integrate these outputs into the architecture models.
.

Deliverables			
Reference	Name	Brief description	Month of delivery
D6300.1	G-MOSAIC SLA template definition	Defines Service provider's responsibilities as well as any aspects relevant the user commitments in allowing the use of its facilities and of any proprietary data needed for the execution of the service.	T0 + 2 T0 + 6

		SLA defines provider responsibilities in terms of network levels and times of availability, method of measurement, consequences if service levels are not met or the defined traffic levels are exceeded by the customer, and all costs involved. The SLA template should be portable with respect to all the GMOSAIC service chains.	
D6300.2	G-MOSAIC SLS template definition	It describes the operational characteristics of the SLA. The SLS consist of expected outputs, drop probability, constraints on the input and output points at which the service is provided, indicating the 'scope' of the service and scenario profiles which must be adhered to for the requested service to be provided. The SLS template should be portable with respect to all the GMOSAIC service chains.	T0 + 2 T0 + 6

B.6.7 Dissemination (WP7000)

The overall objective of this WP is to disseminate knowledge on G-MOSAIC Services on the Security related User Community (DG ECHO, DG RELEX, EUMS, Council, National Ministries of Defence, National Ministries of Foreign Affairs, and any other stakeholders addressed by G-MOSAIC) and to contribute to build a political consensus among decision makers (executive and legislative, European and national) around GMES Services for Security.



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	26	27	28	29	30	32	33	34	35	36	37	39	40	Total
		TPZ	INFOTERRA FRANCE	TCF	DLR	INDRA ESPACIO	GMV	EUSC	JRC	SRC	IAI	FRS	SCOR	TAS-I	TAS-F	AN	Astrium SAS	Infoterra UK	ITD	TUBAF	TNO	IMAA	UNIBAS	EUROSENSE	LUISS	SKF	IST	JR	PLUS	PLANETEK	CRPSM	GISAT	KCL	SYNESYS	Adelphi	SISTEMATICA	Swisspeace	
7000	7100	3,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	6,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	9,1
7000 Total		3,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	6,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	9,1

Table B-28: Staff effort for WP7000

Work package n°	7100		Start date or starting event:			T0		
Wok package title:	**Dissemination**							
WP leader	AN							
Activity type	OTHER (Dissemination)							
Participant ID	TPZ	AN						

Objectives

The overall objective of this WP is, while taking into account appropriate security measures, to support the Technical Coordination in disseminating knowledge on the potential impact of G-MOSAIC Services on the Security related User Community (DG ECHO, DG RELEX, EUMS, Council, National Ministries of Defence, National Ministries of Foreign Affairs, and any other stakeholders addressed by G-MOSAIC) and to contribute to build a political consensus among decision makers (executive and legislative, European and national) around GMES Services for Security.

Description of work

To reach the stated objectives, work to be undertaken by WP7000 will be split in two stages:

- firstly working out an adequate dissemination/communication strategy;
- secondly implementing accordingly appropriate dissemination/communication activities and producing the relevant tools.

At both stages, WP7000 will address the Security "users", who will be the future "customers" of GMES Security Services.

Saying this, it is obvious that the communication messages to be developed will have to be supported by evidence-based arguments as the different users of GMES Security services will be convinced through demonstrated benefits that the G-MOSAIC project will illustrate, even if at this first stage mere service cases related to Regional Crises and not a full range of services will be proposed.

WP7000 tasks during the whole duration of the project will be carried out in close collaboration with the Executive Board and in particular with the partners of WP 6000 (User Engagement & Coordination) and will receive inputs from WP4200, WP5100 and WP6100 regarding GMES Security Stakeholder identification and characterization, that will be necessary for the design of the dissemination strategy.

It will build greatly upon the work carried out in the framework of previous security related GMES projects (especially BOSS4GMES, as far as general perceptions of GMES and commonalities/differences with FTS Risk and Emergencies are concerned), and will be performed in close cooperation with the dissemination activity carried out in the LIMES project.

WP 7000 will be responsible for engineering the Dissemination/Communications strategy and tools. Its approach will be based on a proven methodology.

The ambitions are to:

- develop the communication on the contribution/impact of GMES Security Services to European Security; using services developed by G-MOSAIC as a show case;
- develop the awareness of G-MOSAIC in the Security user community;
- advise on how, and what, to communicate, to "who";
- develop a communication strategy based on well defined arguments and design the means and tools that the latter will require, while taking into account appropriate security measures.

Work to be undertaken in the strategy definition phase will be split in three complementary steps.

1) Defining a dissemination/communication strategy outlining the major axes of the communication strategy in a Communication Strategy and Action Plan (Dissemination Plan). This will be an essential tool of the strategy:
   - listing the arguments and messages retained in favour of G-MOSAIC Security Services;
   - classifying and prioritizing the arguments as a function of the targets, the actions to be undertaken and also to the correct timing for their release/implementation;
   - Defining educational material and tools, as well as dissemination activities.
   - Developing a contacts database for future dissemination of information (to be made available to authorized parties on the project website)

Moreover the Dissemination plan shall propose/describe the validation methodology that will be adopted for assessing the effectiveness of the chosen communication strategy (e.g. indicators and statistics of web traffic, feedbacks from target audience, indicators on media contacts and results, etc.)

2) Validation of the communication strategy: Once the Dissemination Plan will have been validated by the Executive Board, WP7000 will move on to implementation activities.

The following types of communications activities are proposed:

- Definition of a common graphic design approach for all the communications activities (including logo, basic message, colours and illustrations and harmonised layouts), production of a template for project presentations (e.g. PowerPoint template)
- Registration of an appropriate web domain name and relevant email accounts to be associated to the G-MOSAIC public project website
- Development, hosting and management of a G-MOSAIC public project website W3C compliant, in English placing emphasis on graphic illustration of the benefits of G-MOSAIC Security Services. This website will be regularly updated while the project progresses and information and illustrations become available; the project website will include links to the relevant GMES websites. The website shall be active for all the duration of the project and at least 1 year more.
- Assistance and support to the development of specific multimedia contents for the website (e.g. flash animations or similar)
- Production of a four-page project leaflet in English , (including one reprint, if necessary, with the required minor amendments) presenting the project goals and ambitions, its expected results, the G-MOSAIC consortium (1000 copies + electronic copy);
- Production of a 16 page (indicative number) colour "institutional" brochure in English presenting arguments on the impact of G-MOSAIC services on European security in the global context of GMES Security Services (500 copies).
- Production of a 16 page (indicative number) colour "product brochure" in English targeting the users of Security Services including practical examples of G-MOSAIC products and services (500 copies);
- Production of at least two posters in English for trade shows and dissemination activities,
- Design and production of a CDROM in English (largely based on the website content) with selected project material to be distributed during project main events such as Workshops and Training activities (500 copies);
- Management of Media Contacts: set-up and maintenance of contact database, preparation and dissemination of Press Releases, and one-to-one contacts with specialized media (aerospace, defence and security publications, general media, European media) and organization of a "press workshop" at EUSC. Publication of an academic article by FRS/IAI in a specialized media is also foreseen.
- Support to the three user engagement Workshops to be conducted under WP6100 (definition of materials, CDROMs, messages, editorial and graphic support, etc) and financing of the organizational expenses (Travel and daily allowance costs for the users invited to the workshops will be reimbursed from a dedicated budget line in WP1100). Organizations in charge of hosting and organizing the workshops will bear the costs of their logistics including meals.
- Support to the participation of G-MOSAIC to one "unplanned communications activity" (such as MOSAIC contribution to an event on GMES, for instance during the Portuguese EU presidency) provided this contribution does not include unplanned technical costs (subcontracted) or out of pocket expenses other than travel and subsistence.
- Support to the user training Workshops to be conducted under WP6200 (definition of materials, CDROMs , messages, editorial and graphic support, etc)

The contents of the above listed communication activities will be defined in close collaboration with the Technical Coordinator and the Executive Board.
At the end of the project a Final report on dissemination activities will summarise the activities carried out

and will include an assessment of the results achieved.

Subtasks

Define communication strategy and action plan.

Build and manage contacts database (including media).

Design, host and manage a project website.

Design a graphic charter and presentation templates

Design and produce a project CD-ROM

Design and produce a project leaflet.

Design and produce an "institutional" brochure.

Design and produce a "product" brochure.

Design and produce two posters (A0 format)

Organize and manage Media contacts.

Development of material for User Working Groups (WP6100)

Support to the development of material for training sessions (WP6200)

It should be noted that the subtasks will involve subcontracting for "technical" work such as production of material and tools (graphic design. printing, translations and simultaneous translation services, etc). In particular the following items production will be subcontracted:

- Graphic Charter, logo and presentation templates
- Website design, hosting and management
- Design and burning of project CD-ROM (500 copies)
- Graphic design and printing of project leaflet (1000 copies + electronic copy)
- Design and printing of posters (at least 2)
- Graphic design and printing of "institutional" brochure (500 copies)
- Graphic design and printing of "product" brochure (500 copies)

Role of participants

Arsenale Novissimo
Will be leading the work package and will be involved in all subtasks.

TPZ
TPZ will manage all the specific subcontracts envisaged in this WP: to organize the User participation to dissemination events and to the User Advisory Board, in liaison with WP6100; to assure the proper realisation of the web site and of the various dissemination materials. The Statement of Work(s) and the relevant quality check of the work carried out by each subcontractor will be done in close collaboration with AN.

Deliverables

Reference	Names	Brief description	Month of delivery
D7000.1	Dissemination Plan	Communications Strategy and action plan and contact database, including: - hard copies of web pages and assessment of traffic - report on media contacts and results	T0+06 T0+12 T0+24
D7000.2	Dissemination Material	Logo, Graphic charter including presentation template (ppt)	T0+01
		(Project WEB site)	T0+3
		Project leaflet (hard copy)	T0+06 T0+24
		Institutional brochure (hard copy)	T0+12
		Product brochure	T0+18
		Poster (hard copy)	T0+12 T0+24

B.7 Participants to G-MOSAIC Consortium

This Chapter reports brief descriptions of each participant to G-MOSAIC Consortium.
The following Figure (Fig.7-1) depicts the geographical distribution of involved organizations.

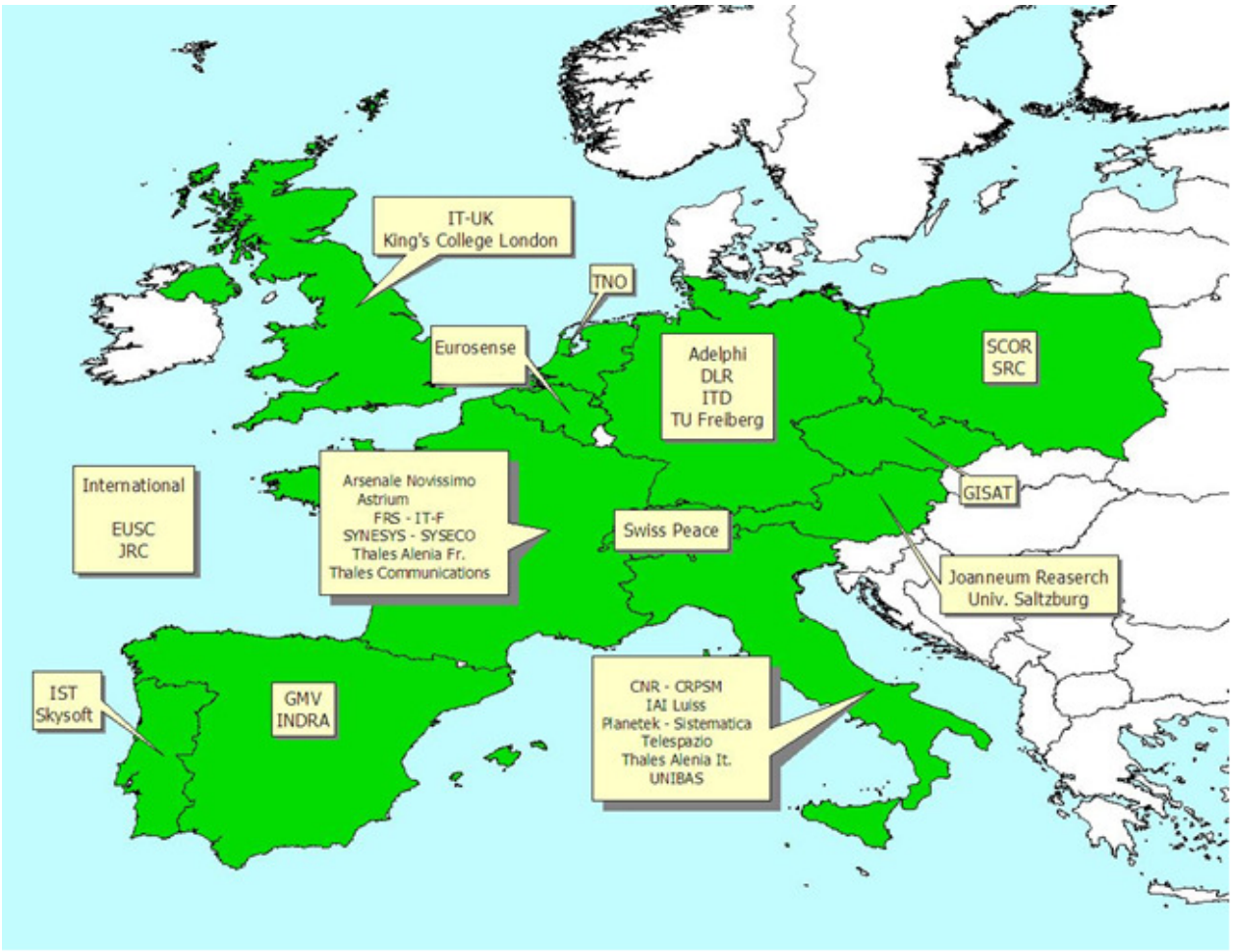


Fig. B-14: Geographical distribution of G-MOSAIC Consortium

1	Telespazio	Italy

Company profile
Telespazio, a joint venture between Finmeccanica (67%) and Thales (33%), is one of the main world-wide players in the satellite services: from management of satellites to Earth observation services, from satellite navigation to the broadband multimedia telecommunications. Telespazio plays a role as leader in the reference markets making use of the technological skills acquired over the years. Its takes part in the major European space programmes: COSMO-SkyMed and Galileo. Telespazio main business areas are: Satellite operations, Defence, Networks and Connectivity, Earth Observation, Navigation and Info-mobility.

Main Roles in G-MOSAIC
Project Coordinator; leader of the services in support of crisis management operations; responsible for the development and prototyping and pre-operational demonstration of the common security portal for services delivery.

Relevant previous experience
Telespazio is engaged in the remote sensing information processing chain at all levels: Satellite Data Acquisition and Pre-Processing, Data Distribution/Application, Engineering Activities and related projects. It carries out data processing for geographic and environmental applications. Telespazio participates to several projects particularly aiming at EO based products/services development for supporting risk management activities in the framework of Space national/European Agencies. A list of the main security projects among all the others (PREVIEW, RISK-EOS)realized in the framework of GMES, is provided below:
LIMES Integrated R&D Project co-funded by EC, under FP6, to define and develop prototype information services, based on satellite technology, for security management at EU and global level. Telespazio leads a huge consortium (more that 50 partners) , including the main Satellite Service Providers, Security related Industries, Research Institutes, Reference Users
MARISS Consolidation ESA-funded project in the framework of GMES Service Element on security and immigration control, with ship detection services, integrating EO data with AIS, VTS data. Telespazio is the Prime Contractor, with a European Industrial Consortium of Service Providers and System Developers, and Institutional users.
RESPOND Scaling Up ESA-funded project in the framework of GMES Service Element on information services for humanitarian aids support activities, such as rapid mapping, thematic mapping, situation mapping. Telespazio is involved as Service Provider of Basic and Thematic Mapping derived by VHR images and in the future by COSMO/SkyMed. Telespazio also directly interfaces INTERSOS, one of the main Italian ONG, as a User of the Respond Services.

Key Staff Members of G-MOSAIC
Name: Sergio Proietti
Present job and responsibilities: Scientific Programs division in TPZ; Operational Project Coordinator for the LIMES project
Work experience: Degree in Electronic Engineering; system engineering, technical coordination of R&D projects since 2000.
Role in G-MOSAIC: Project Coordinator.

Name. Luca Pietranera.
Present job and responsibilities: Earth Observation division. Innovative products development.
Work experience: Degree in Physics in 1982; Relevant experiences in sensors, processing methodologies, end to end service design and development. Technical manager of several projects. Author of 20 peer refereed scientific papers, 4 international patents. Teaching experiences in physics, Remote sensing principles and applications. Instructorship on GIS, EO and GPS for UN.
Role in G-MOSAIC: Project Thecnical Manager, and responsible for TPZ technical activities.

Name: Annalaura Di Federico.
Present job and responsibilities: Earth Observation division in TPZ.
Work experience: degree in Environmental Engineering since 2000. Technical experience in environmental applications. In the past 5 years involved in several GMES projects: Risk EOS as project manager, RESPOND as proposal manager from Telespazio side. Project manager for ESA FUEGOSAT NOD focussed on the thematic of fires detection and monitoring.
Role in G-MOSAIC: Operational Manager.

2	**Infoterra France**	**France**

Company Profile
Infoterra France, a 100% subsidiary of EADS Astrium and part of the Infoterra Global Group is a leading provider of geospatial products and services and an innovator in digital data processing, automation, develops advanced services innovating solutions for management and prevention of natural risks, surveillance of agriculture (Farmstar service), and environment control. Infoterra France develops its activities around 4 major axes:

- development and commercialisation of cartographic data production systems, including the photogrammetric suite, "Pixel Factory TM", multi-sensor and highly automated, and the classification tool, "Overland TM", the mark of a new generation in analysis and land cover tools;
- acquisition of satellite and aerial data, and the production of cartographic data for defence and security, risk management, agriculture and environment, local authorities as well as for telecommunications operators, a sector in which Infoterra France is the world leader;
- development of tailored software programmes (management and natural risks) and specialised information supply services, such as Farmstar (agriculture and precision), which provides advice and recommendations based on satellite imagery analysis;
- developments of GMES systems, applications and services.

Main Roles in G-MOSAIC

- Infoterra France, as geo-spatial products provider is involved in the WP2300 "crisis indicators" providing service chains and in the WP3300 "Crisis management operations" providing reference maps and map updates both in crisis rooms and on-site dedicated mobile equipment. Infoterra is involved in Security services portfolio definition.

Relevant previous experience: Infoterra France has taken a leading role in the GMES risk management services through two complementary projects, under the EURORISK banner:

- Prime contractor of the RISK-EOS GSE project dedicated to flood and fire risk management
- Coordinator of the PREVIEW project, within the 6th Framework program.
- Key partner of BOSS4GMES, member of the executive committee, leading the FTS Emergencies

In addition, Infoterra France is also involved in the RESPOND and GEOLAND projects.

Key Staff Members of G-MOSAIC
Name: Bruno Vatan.
Present job and responsibilities: Astrium EO GS Engineering – Export & Security business Development, previously ASTRO+ PASR project coordinator.
Work experience: 27 years of experience in techniques and management in high technology companies: Thomson CSF Avionics and Astrium/Infoterra Group since 1988.
Role in G-MOSAIC: In charge of the Operational Coordination and to contribute to Transverse Activity coordination, in charge to lead WP2000 and WP2100 and to contribute to WP4200
Name : Pascale Cayrol, Ph. D. in remote sensing at the Institut National Polytechnique – Centre d'Etude Spatiales de la Biosphère
Present job and responsibilities: Agri-environment application expert. Development of MERIS based crops monitoring products and of the processing chain used for their generation (GSE land and Geoland), Production of Crops distribution and irrigation demand maps in manifold regions of Europe and Russia. In 2007, FARMSTAR service experimental campaign in the South West of France.
Role in G-MOSAIC: involved in Crisis indicator WP2300.
Name: Jérôme Soubirane.
Present job and responsibilities: Technical manager of the RISKEOS project.
Work experience: Integration and operational deployment of Mapping and Intelligence centres (natural risks, military intelligence). Use of remote sensing techniques for studies and projects in various domains: pollution, CAP supports, hydrological studies, land cover production.
Role in G-MOSAIC: involved in Geo-spatial sport to crisis management operations.

3	**Thales Communications SA (TCF)**	**France**

Company Profile
THALES Communications France (TCF) belongs to the THALES Group which is a leading international electronics and systems group serving defence, aerospace and security markets worldwide. Leveraging a global network of more than 20,000 high-level researchers, THALES offers a capability unmatched in Europe to develop and deploy critical information systems. TCF is a major actor worldwide in the definition & modelling of Service Oriented Architectures (SOA) and related standards, and in the development and deployment of large secured Information and Communication system of systems in the security and defence fields. TCF is a leading company in multi-sensor multi-platform real time digital acquisition and processing of raw data from EO/IR sensors and has developed intelligence systems for different MoDs and Intelligence Agencies, among others the MINDS system, which has been selected by EDA for EUSC. Since many years TCF has got large expertise in data/text mining technologies and has developed intelligence solutions for open-source management and analysis (SPRINT) and decision-aid tools (ADAC and PACIFIC) dedicated to strategic analysis of worldwide crisis situations (political, humanitarian, technological, .) Moreover TCF is highly involved in the GMES initiative and in several GMES projects related to security. THALES Communications acts as the Coordinator of the OSIRIS FP6 IP Project, defining and deploying a Service Oriented Architecture (SOA) interfacing in-situ systems and users application environment. As such TCF participates to GEO/GEOSS architectural activities.

Main Roles in G-MOSAIC
Thales Communications in leader of WP5000 dealing with Modelling GMES Security Sustainability.
TCF is in charge of Service Architecture Modelling for Security Delivery (WP5300) and of Service Architecture for Security Evaluation (WP5700).

TCF contributes to Contracts and QoS (WP6300) and to Service interoperability standards, models (WP4500) and Common gateway for service delivery (WP5400).

TCF contributes also to WP4400.

Relevant previous experience
See experience of key staff members.

Key Staff Members of G-MOSAIC
Mr Jean Luc GARNIER is Technical coordinator of the THALES Architecture Framework.
His domains of expertise include Intelligence and multi-sensors Surveillance systems and Electronic Warfare, Airborne radar & mission computer, Avionic Systems, Software engineering, Information and signal processing Telephony and networks, Compilers, linkers, automatic test tools, Simulation.
Architecture Frameworks, System management, Service Oriented Architectures. Member of AFIS and INCOSE.

Mrs Hélène BACHATENE is a System Architect at Thales Communications. She has experience in System of systems architectures, command and control systems and network systems for civilian and military applications, and has contributed to many studies on threat analysis and dependability of networked systems, either military or civilian. Contributor to standardisation activities (AFIS, BNAE).

M. Bertrand AUBLIN, Project Manager at Thales Communications.
He is responsible for the development of information analysis applications.
In particular, he is project leader of the THALES plat-form for open-source analysis SPRINT.

Mrs Danielle TACYNIAK, Project Manager at Thales Communications, is Engineer. She has vast experience in Systems of Systems architectures and sensors, for civilian as well as military applications. She is the OSIRIS-FP6 Project Coordinator and is also highly involved in several GMES Projects.

4	Deutsches Zentrum fur luft und Raumfahrt e.V. (DLR)	Germany

Company Profile
The German Aerospace Centre (DLR) is the largest research establishment for engineering sciences in Germany. Its scientific-technical expertise is in four main research areas: aerospace, aeronautics, energy and transport. Earth Observation experience: DLR's Cluster of Applied Remote Sensing Institutes, C-AF (the German Remote Sensing Data Centre DFD and the Remote Sensing Technology Institute IMF) has full access to DLR facilities such as the satellite ground segments, robot data archives, and other infrastructure important for the network. DLR/C-AF is strongly involved in many national European and international R&D projects in the context of satellite remote sensing going all the way from satellite building, operation, reception, data processing and archiving and of course remote sensing application developments and operation. These involve TerraSAR, Rapid Eye, BIRD, ERS, ENVISAT, IKONOS ROC Operation, IRS reception and many more.

Main Roles in G-MOSAIC
DLR is attributed several different roles within G-MOSAIC. Within the project management it coordinates the ground segment interface with ESA as the central data provider to the project and contributes to the scientific advisory board. Within the development of service cases and service chains it coordinates the activities regarding illegal activities and consequence management. For the cross-cutting aspects in GMES security services it contributes to the analysis of GMES capabilities, the definition of the security services portfolio definition and is coordinating the data access scenario.

Relevant previous experience
DLR is involved in many ESA/EC projects and programs like GMES service elements: RESPOND, SAGE, FOREST MONITORING, TERRAFIRMA and PROMOTE. DLR was also involved in the Preparatory Action on Security Research (PASR) through the project GEOCREW. DLR-DFD is coordinating the EC network of excellence "Global Monitoring for stability and security – GMOSS". Within LIMES, DLR is responsible for the Service Cluster of Humanitarian Relief and Reconstruction (WP 4000) and builds here strongly on the experiences and expertise gained in the 'Centre for Satellite based Crisis Information'. Furthermore, it leads and participates in several national projects on security related issues.

Key Staff Members of G-MOSAIC

Dr. Peter Reinartz, is unit head of the unit "Photogrammetry and Image Analysis", at the German Aerospace Centre (DLR), Remote Sensing Technology Institute (IMF). He has more then 20 years of experience in image processing and remote sensing and more than 100 publications in this field. His main interests are in direct georeferencing, stereo-photogrammetry with space borne and airborne data, generation of digital elevation models and interpretation of VHR data from sensors like Ikonos, Quickbird a.o.. As project manager he has a lot of experience in the coordination and management of national and international teams and projects.
Role in G-MOSAIC: Project leader for DLR contribution.

Dr. Danielle Hoja, has a degree as graduate engineer (Dipl.-Ing.) of cartography. She is working at the Remote Sensing Technology Institute of DLR since 2000. In 2004 she received the PhD from Technical University Dresden. Since then she works in the image processing department on georeferencing of optical airborne and spaceborne images as well as on digital height model generation from optical stereo image pairs. The main application fields are on security issues (GMOSS, LIMES, DeSECURE)

Thomas Krauß, is member of the unit "Photogrammetry and Image Analysis", at the German Aerospace Centre (DLR), Remote Sensing Technology Institute (IMF), since July 2004. He works on DSM generation algorithms, automatic traffic detection and other image analysis tools. He is team supervisor of the team on 3D applications of remote sensing data and has worked within several projects on security issues within GMES (e.g. GMOSS, LIMES)

Olaf Kranz, has a degree in physical geography (2000) from the University of Marburg (Germany). In 2005 he received the academic title MSc (GIS) from the University of Salzburg after two years distance learning and a Master Thesis about the Integration of Multi Criteria Evaluation and GIS. He joined the German Remote Sensing Data Center (DFD) at DLR in March 2007 after several years of experience in Geoinformation Science and is currently working in the Center for Satellite Based Crisis Information (ZKI)

5	**Indra Espacio S.A. (INDRA ESPACIO)**	**Spain**

Company Profile
Indra Espacio S.A. is subsidiary of Indra Sistemas (major IT Spanish company with over 20,000 people, present in IBEX-35) responsible of the space related activities. Spanish leader company in Remote Sensing, GIS, Digital Image Processing, Software Development and Ground Segment Systems with large experience in EO data processing in the national and EU market.

Main Roles in G-MOSAIC
Leadership in "non-proliferation and treaties", "Cross-cutting analysis of GMES capabilities & Stakeholders identification" and "contracts and QoS models". INDRA ESPACIO will contribute in different services cases such as: critical assets monitoring, Illegal crop monitoring, thematic mapping in planning for crisis and damage assessment in geo-spatial support for crisis management operations.
INDRA ESPACIO will also contribute in G-MOSAIC transverse and coordination activities (Cross-missions and Services)

Relevant previous experience
Participation in GMES projects. Leadership of urban mapping activities (GUS project –prime contractor-, GSE-Land project, forthcoming Geoland-2).

Expertise in radar based mapping for security applications and urban mapping. Developments in the frame of GMES and ESA with EUSC as end user.

Knowledge of security sector from a wide base of national users (Defence, Intelligence, Police, etc)

High value urban mapping projects for hot spot and land use change detection, cartography update and environmental applications.

Key Staff Members of G-MOSAIC

Name: Julia Pecci López
Present job and responsibilities: Remote sensing and GIS expert. Responsibilities: development of applications and services, R+D, quality controls, technical coordination of production, tenders, etc
Work experience: more than 7 years working in remote sensing applications. Expertise: image processing and thematic cartography development, and oil &gas, urban surveillance and environmental applications.
Role in G-MOSAIC: Transverse and coordination WP activities.

Name: Carmelo Alonso.
Present job and responsibilities: System Engineer..
Work experience: Theoretical Physics Degree (1994). Master in Environmental Engineering and Waters Management (1995). From 1995, working for the Remote Sensing Applications and Image Interpretation equipment of the Remote Sensing Department of INDRA ESPACIO. Remote Sensing applications, SAR data processing and GIS engineering.
Role in G-MOSAIC: Service cases activities.

Name: María Tamame Nicolás.
Present job and responsibilities: Remote sensing technician. Photo-interpretation and image processing.
Work experience: Degree in Biology (2004). Experience in Remote Sensing Applications and Image Interpretation equipment of the Remote Sensing Department of INDRA ESPACIO.
Role in G-MOSAIC: Service cases activities.

6	GMV Aerospace and Defence S.A. (GMV)	Spain

Company Profile

GMV Aerospace and Defence S.A. (GMV) is a Spanish, privately owned company, integrated within the industrial group Grupo Tecnológico e Industrial GMV S.A and devoted to engineering, software development and turn-key systems integration for the aerospace, security and defence sectors. The sisters companies of the group provide sound complementary experience in the fields of telecom, e-business (SGI S.A.), transport and industry (GMV Sistemas S.A). GMV has participated in all types of missions for Mission Analysis, Flight Dynamics, Satellite Control Centres, Data Processing, Earth Observation based applications and Mission Planning.

GMV delivers innovative solutions to a variety of national and international customers in its three target markets, Space, security and Defence, having been developed a large number of operational and research projects. In particular GMV´s activities include a large number of projects within the EU programs, being currently involved on several on going successful initiatives.

Main Roles in G-MOSAIC

GMV will be the responsible for the Critical Assets service chains implementation coordinating the different partners providing building blocks for such chain. GMV will be responsible for the delivery of final products to the users. GMV will also bring part of the service chain for planning operations outside Europe. In addition GMV will bring all its past experience to contribute in the definition of the security core service portfolio.

Relevant previous experience

GMV as a wide experience in GMES and security and defence projects in the frame of ESA, EC, EDA, NATO and Spanish ministry of interior and defence.
GMV´s activities include a large number of projects within the EC programs and GMES in particular: GMES security **LIMES** project, Wide Information Network (**WIN**) project, **PREVIEW** (PREVention, Information and Early Warning pre-operational services to support the management of risks), **OSIRIS** (In-situ sensors for environment and crisis management).
GMV has also a wide experience in the ESA GSE program participating in **MARISS** (Maritime Security), **RESPOND** (Humanitarian Aids), RISKEOS (Risk management), **MARCOAST** (Ocean services including oil spills), **FOREST MONITORING**, **PROMOTE** (Atmosphere)
Within PASR, GMV participates in **ISCAPS** (small areas security), **WINSEC** (communications security), **GEOCREW** (early detection of man-made crises).
GMV is also leading the **HARMLESS** project on the use of GALILEO, GPS, GNSS application in combination with EO for security and crisis management.

Key Staff Members of G-MOSAIC

Name: Antonio Tabasco.
Present job and responsibilities: Senior project manager at GMV.
Work experience: Long experience acting as GMV project manager in several EC projects: Cluster leader for land security within the LIMES project, he has been involved as project manager in the EC PREVIEW, EC GEOCREW, EC WIN, EC BEINGRID.
Role in G-MOSAIC: Antonio will be WP2400 leader and GMV POC.

Name: Maria Julia Yagüe.
Present job and responsibilities: Senior project engineer at GMV.
Work experience: Long experience in earth observation based application. Julia has a wide experience in the field of geo-information products production and analysis and is currently working in several GMES projects such as ESA RESPOND and FOREST MONITORING.
Role in G-MOSAIC: Julia Will act as technical responsible for GMV activities.

7	**European Union Satellite Centre (EUSC)**	**Int**

Company Profile
The mission of the EUSC is to support the decision-making of the European Union in the context of the Common Foreign and Security Policy (CFSP) and in particular of the European Security and Defence Policy (ESDP), including European crisis management operations, by providing material resulting from the analysis of satellite imagery and collateral data.
Another of the Centre's activity is to train specialists (such as imagery analysts, end-users of imagery-based products) as well as develop concepts regarding the standardization and the interoperability of imagery analysis and supporting computing and communication systems, based on investigations of current trends in the imagery markets and futures programmes).

Main Roles in G-MOSAIC
Satellite Centre will be the referent participant for the development of the service related to support to EU operations as it is already operational in this area for many years. Additionally it will support the development of most the other service targeted by G-Mosaic. The Satellite Centre will also lead training and user engagement programes due to its already established permanent relations with users related to EU security and due to its experience for users training.

Relevant previous experience
The EUSCwas involved in all reflection papers on GMES security domain. It is an active second pillar participant in the GMES Advisory Council. The EUSCis today perceived as a key GMES European-level stakeholder. Furthermore the Satellite Centre participated in all GMES projects related directly to security such as: LIMES, MARISS, BOSS4GMES, TANGO, GMOSS, ASTRO+ (PASR).

Key Staff Members of G-MOSAIC
Name: Denis Bruckert.
Present job and responsibilities: GMES Coordinator.
Work experience: PhD in Remote Sensing, Head of EUSC Geomatic Section, GMES Coordinator.
Role in G-MOSAIC: Coordinator.

Name: Melanie Fournier.
Present job and responsibilities: Project Administrator.
Work experience: Cartographer/ Geographer Analyst within the DRM (Military Intelligence Directorate) in SAG (Geographical Analysis Section).
Role in G-MOSAIC: Project Officer.

Name: Alessandra Ussorio.
Present job and responsibilities: Project Administrator.
Work experience: I.T. Senior Analyst, Scientific Officer in the Nuclear Safeguards Unit (NUSAF)– Institute for the Protection and Security of the Citizens (IPSC) in JRC.
Role in G-MOSAIC: Project Officer.

8	Joint Research Centre (JRC)	Int

Company Profile
As a service of the European Commission, the JRC is a reference centre of science and technology for the European Union. Its general mission is to provide customer-driven scientific and technical support for the conception, development and monitoring of EU policies. Its Institute for the Security and Protection of the Citizen (IPSC) contributes to the development of European Security Research and provides scientific and technologic support to EU security policies. The ISFEREA and VERTEC actions, which contribute to G-MOSAIC, have a particular focus on contributing to the development of global stability and security, by supporting the Common Foreign and Security Policy (CFSP), the Community external action (stability instrument, humanitarian aid, development co-operation, European Neighborhood policies) and non-proliferation of WMD and nuclear technologies.

Main Roles in G-MOSAIC
JRC leads the Scientific Advisory Board in the project. It has a coordinating role in "Support to intelligence and early warning", in particular in the Crisis Indicators and Nuclear treaty monitoring tasks and contributes to several other thematic tasks. JRC will serve as the user liaison to Commission services (DG RELEX, DG ECHO) and the IAEA (for nuclear treaty monitoring).

Relevant previous experience
The JRC's involvement in the G-MOSAIC project builds on previous and current participation in the context of GMOSS (on treaty monitoring, security concepts, geospatial processing, border monitoring, vulnerable populations etc), in RESPOND (GMES services supporting humanitarian relief, disaster reduction and reconstruction), Preview (PREVention, Information and Early Warning pre-operational services to support the management of risks)and the LIMES projects (Land/Sea Integrated Monitoring for European Security project).

Key Staff Members of G-MOSAIC

Name: Guido Lemoine.
Present job and responsibilities: Scientific officer.
Work experience: 20+ years in remote sensing, geospatial information technology, project management.
Role in G-MOSAIC: JRC team leader, technical contributions, user liaison.

Name: Thomas Kemper.
Present job and responsibilities: Scientific officer.
Work experience: PhD, 10 years in remote sensing, geomatics, project management.
Role in G-MOSAIC: Illegal Activities, Crisis indicators.

Name: Gunter Zeug.
Present job and responsibilities: Scientific officer.
Work experience: 7 years in remote sensing, GIS, geomatics, project management.
Role in G-MOSAIC: Crisis indicators, technical contributions.

Name: Erik Wolfart.
Present job and responsibilities: Scientific officer.
Work experience: 10+ years in computer vision, data base systems, GIS.
Role in G-MOSAIC: nuclear treaty monitoring.

Name: Elodie Pagot.
Present job and responsibilities: Scientific officer.
Work experience: PhD, 7 years in remote sensing, GIS.
Role in G-MOSAIC: illegal mining, damage assessment, urban monitoring.

Name: Sandra Eckert.
Present job and responsibilities: Scientific officer.
Work experience: PhD, 7 years in remote sensing, GIS.
Role in G-MOSAIC: urban monitoring, land use classification, terrain analysis.

9	**Space Research Centre Polish Academy of Sciences (SRC) (Centrum Badan Kosmicznych Polska Akademia Nauk)**	**Poland**

Company Profile
Space Research Centre of Polish Academy of Sciences is a governmental, non-profit, research organization that was established in 1976 and employs 120 persons (85 scientists, engineers and specialists). SRC carries out research on different aspects of the solar system science as well as on planetary geodesy and geophysics. It has developed the expertise in designing and manufacturing space instruments and subsystems and delivered hardware and software to many ESA missions (Cassini/Huygens, Integral, Rosetta, Mars-Express, Herschel, etc.). Its remote sensing department develops also optical ground monitoring instruments. In space applications, SRC covers three different topics: GMES, Galileo and security. In GMES and Galileo the institute serves as a focal point for Polish research activities, contacts with administration and with service providers. At the same time, SRC develops relevant instrumentation (e.g. time transfer systems for Galileo) and acts as a data processing unit. In the field of security, the role of SRC has been to collect end-user needs concerning satellite technology applications (EO, navigation, telecommunication) and to promote space techniques, in particular through organizing demonstration exercises. In the context of G-Mosaic, SRC can offer its experience gained in several European security-related projects, such as ASTRO+, TANGO, and LIMES as well as in the port monitoring project PEARL (6^{th} FP).

Main Roles in G-MOSAIC
In G-Mosaic, SRC will participate in two WPs. In WP6100 it will contribute to user engagement plans, organizing first of the three workshops and contributing to the organization of all other workshops.
In WP2600, the role of SRC will be: (i) to participate in preparing methodology for continuous socio-economical and geo-environmental data gathering concerning the regions/countries in Africa and Asia where large scale migrations take place, (ii) to define and archive the reference information about the population dynamics and movements, border permeability, transportation infrastructure, etc. in the regions in question, (iii) to take part in designing, developing and testing service chains to the pre-operational stage.

Relevant previous experience
SRC was involved in several security projects:
ASTRO+ - EC security project dedicated to exploring possible applications of Earth Observations, satellite navigation and telecommunication during natural and man-made disasters; SRC participated in the pilot study on EO data employment in tracing soil pollution and prepared a demonstration about space technology exploitation during a disaster.
LIMES – 6^{th} FP IP dedicated to EU-level security issues, such as critical infrastructure monitoring, event planning, land and marine border protection. SRC is responsible for land-border monitoring WP.
TANGO – 6^{th} FP IP that aims at exploiting satellite telecommunication in security applications.
The SRC involvement in **PEARL** concerning dissemination and exploitation of environmental port monitoring system, therefore contacts with end-users, is also relevant to the G-Mosaic objectives.

Key Staff Members of G-MOSAIC

Marek Banaszkiewicz, Director, 30 years in space research and applications, co-I on many ESA projects, served for 15 months in JRC (Ispra) as DNE – GMES focal point in NMS, in G-Mosaic will contribute to WP2600 and provide expertise about fusion of satellite and socio-economic data.

Anna Burzykowska, expert in space applications in foreign and security policies of EU, will participate in WP2600 and provide the background information concerning crises and migrations in Africa and Asia.

Bartosz Buszke, manager, will participate in WP6100 and will be responsible contacts with end users.

Arkadiusz Kiraga, researcher, will participate in WP2600 and work on analysis of satellite images.

10	Istituto Affari Internazionali (IAI)	Italy

Company Profile
The Istituto Affari Internazionali (IAI), non-profit organisation, is funded by individual and corporate members, public and private organisations, major international foundations, and by a standing grant from the Italian Ministry of Foreign Affairs. The Institute's main objective is to promote an understanding of the problems of international politics through studies, research, meetings and publications. The IAI has a very strong background in the security field, having begun working on its first studies in the security sector in 1967 with leading European and American research centers.

Main Roles in G-MOSAIC
IAI will define European security policy up to the identification of GMES contribution to it.
In this effort, IAI will carry on an inter-pillar study, taking into account organizational and procedural policy aspects through scenario prioritisation and elementary needs analysis; addressed policies analysis (via WP 4100).. IAI will also contribute to the scenarios definition both in crisis prevention and in mission engagement case (WP2100 and WP3100). Moreover, IAI will support WP leaders in the user engagement task through multi-national and European high-level contacts.

Relevant previous experience
IAI has been selected for two EC Preparatory Action for Security 2004 : Astro + (Advanced Space Technologies to Support Security Operations) and SeNTRE (Security Network for Technological Research in Europe). In both projects, IAI managed the "end user engagement program" together with a network of industrials, research centers and think-tanks. Furthermore, for the 2006 LIMES Integrated Project and the 2006 Bio3r support action, IAI managed the "end user engagement". Working for different administrations (EC, MoD, Police, NATO, Ministry of Foreign Affairs, Ministry of Industry, Ministry of Research…) and for privates companies, IAI has developed strong competences for the analysis of the security scenarios, from political to technical-operational aspects.

Key Staff Members of G-MOSAIC

Name: Stefano Silvestri.
Present job and responsibilities: President of the Institute.
Work experience: deputy secretary of defence for the Italian Government.
Role in G-MOSAIC: Scientific advisor.

Name: Jean-Pierre Darnis.
Present job and responsibilities: Senior research fellow, project coordinator.
Work experience: associated professor (University of Nice).
Role in G-MOSAIC: project coordinator.

Name: Giovanni Gasparini.
Present job and responsibilities: Senior research fellow, project coordinator.
Work experience: Co-Director of the Transatlantic Programme on ESDP of the IAI.
Role in G-MOSAIC: Senior research.

Name: Lucia Marta.
Present job and responsibilities: Research Assistant.
Work experience: Research Assistant in IRIS (French think tank).
Role in G-MOSAIC: WP2100, WP3100 and WP4100.

11	Fondation pour la Recherche Stratégique (FRS)	France

Company Profile
The Foundation for Strategic Research (FRS) based in Paris is one of the most prominent independent French research institutions in the field of Security and Defence. As a public-interest foundation, it has a two core missions:

- promoting the national public debate on strategic issues related with the security and Defence;
- Carrying out research works and studies in the field of security and defence with the aim to bring an independent expertise to interested decision-makers, either public or private.

The FRS has developed a particular expertise on the relationship between strategy and advanced technology- related issues.
It leads studies on: space programme implementation policy; Advances in high technology of value for defence and security issue; High technology control policies and proliferation related issues; the role of information technologies in security doctrines and policies; the Importance of Dual-purpose and Dual-use technologies.
The FRS is also conducting work on new conflict patterns and situations with a particular expertise in the analysis of new actors and factors (ethnic groups, non-state actors like NGO's, media, etc, the resurgence of nationalism, the division of former powers states...) in security.
The research conducted at the FRS in this area rests on different types of work such as: concepts and theories of contemporary defence strategy; the study of modern forms of violence; the evolution of states' and non-state actors' strategies, the homeland-related security issues.

Main Roles in G-MOSAIC
FRS will contribute to the following G-MOSAIC activities; support to intelligence and early warning (via WP 2100) and support to crisis management operations (via WP 3100)

Relevant previous experience
FRS has been involved in a number of security related studies commissioned by the European Commission via the Preparatory Action in the field of Security Research: FRS has been involved in : ASTRO+ (PASR), SeNTRE (PASR), ISACPS (PASR); it is also involved in the LIMES FP6 programme (LIMES for Land Integrated Monitoring for Environment and Security). FRS has also been co-leader of a Study commissioned in 2007 by the European parliament (Sub-Commission for Defense-Directorate General for External Policies of the Union): "The cost of Non-Europe in the field of satellite based systems", to be published soon.

Key Staff Members of G-MOSAIC:
Name: Pasco (Xavier).
Present job and responsibilities: Senior Research Fellow.
Work experience: leader of "space, high technology and security" research programme at FRS, 18 year experience in the research field with numerous European projects participation (PASR projects).
Role in G-MOSAIC: leader of FRS involvement
Name: Gaillard-Sborowski (Florence).
Present job and responsibilities: Research Fellow.
Work experience: contributing to "space, high technology and security" FRS research programme at FRS, Participation to European projects.
Role in G-MOSAIC: support for "Addressed Policies" FRS contribution.
Name: Klein(Michel).
Present job and responsibilities: Associate Research Fellow.
Work experience: Former Army general, expert in Information systems and operation planning in Africa, crisis analysis.
Role in G-MOSAIC: Analytical Support for WP 2100 and 3100 FRS contribution**.**

12	Satelitarne Centrum Operacji Regionalnych S.A. (SCOR)	Poland

Company Profile
Satellite Centre for Regional Operations (SCOR) is a remote sensing company offering its customers geographic data, and products based on satellite imagery. Its purpose is to better describe measure and manage the Earth. SCOR was created as a public – private partnership by Polish Government and by TECHMEX S.A. – one of the leaders on Polish IT market. SCOR owns and operates satellite ground station in Europe. Its capability serves the national demand for very high resolution imagery intended for national security, homeland defence, emergency responding, environmental monitoring, spatial planning, and many other purposes.

Main Roles in G-MOSAIC
Main SCOR contribution to WP 2600 could be gaining of satellite imagery as well as their elaboration and interpretation. SCOR has personnel trained in intelligence from satellite imagery.
SCOR will concentrate on gathering and analysing such intelligence information like refuges camps, migration routes, urban development, out of routes movement, some agricultural aspects (soil use, forests), and some environment factors.
On the technical side, SCOR will work, together with SRC and IT-D, on developing methods of optical VHR and SAR data merging/fusion. Both optical and radar data could be used in the WP2600 service chains.
Finally, SCOR together with other partners will dedicate some effort on validating the WP output through in-the-field inspection.

Relevant previous experience
Although SCOR has never participated in European project has vast experience on collecting optical imagery on country level. SCOR collects more than 300.000 sq. km per year and process it to orthophotomap. SCOR performed for different clients production of value added products like v-maps and 3D models. SCOR specializes also in remote sensing, analysis, change detection and interpretation made *inter alia* for intelligence.

Key Staff Members of G-MOSAIC
Name: Arkadiusz Kowalczyk.
Present job and responsibilities: Technical Director.
Work experience: Has military background and large experience in IT systems as well as knowledge in remote sensing and earth observation systems.
Role in G-MOSAIC: supervising SCOR's activities in the program.
Name: Jerzy Wisniowski, Ph.D.
Present job and responsibilities: Tasking Controller.
Work experience: Has military background and large experience in GIS systems as well as knowledge in remote sensing, imagery analysis.
Role in G-MOSAIC: imagery collection, image interpretation, data fusion, in field inspection.
Name: Bogdan Kolanowski, Ph.D.
Present job and responsibilities: Tasking Controller.
Work experience: Has military background as well as academic and large experience in GIS systems as well as knowledge in remote sensing, imagery analysis.
Role in G-MOSAIC: imagery collection, image interpretation, data fusion, in field inspection.
Name: Jerzy Durlej.
Present job and responsibilities: Data Specialist.
Work experience: Has experience in GPS systems as well as knowledge in remote sensing, imagery analysis.
Role in G-MOSAIC: image interpretation, data fusion, in field inspection.

13	Thales Alenia Space Italia S.p.A.	Italy

Company Profile
Thales Alenia Space belongs to the very recently creation of the 3° group in the Space Market, created from the acquisition by Thales Group of Alcatel Alenia Space France and joint with Alcatel Alenia Space Italia. This new Company takes the name of Thales Alenia Space.
Thales Alenia Space focuses its activities on the Commercial telecommunication satellites & systems, European institutional satellites & systems, Satellite navigation systems, Meteorological and oceanographic satellites & systems, Radar and optical observation satellites & systems, Scientific satellites, Defense communications and observation satellites & systems, Orbital infrastructures and transportation. Thales Alenia Space delivered complete systems for telecommunications, observation, navigation and defense. Thales Alenia Space has launched several Space bus Satellites, Telecom payloads and produce several Space Infrastructure & Transportation.
Thales Alenia Space provides also ground segment, turn-key complex and geographically distributed infrastructure, including Satellites Control Segment, Mission Planning segment, Civilan User Segment, Defence User Segments, mobile processing stations and programming cells. Thales Alenia Space is also a leading actor in thematic and environmental applications, infrastructure projects and security and defence dual use research projects for the EU or ESA, based on the use of multi-sensors EO information.

Key Staff Members of G-MOSAIC

Name: Claudio Catallo.
Present job and responsibilities: Program Manager.
Ing. Claudio Catallo, Program Manager. He joint Contraves in 1978 till 1983 as System Designer of Radars. In 1983 he joints Alenia Spazio as AIV/EGSE responsible for several satellites (Artemis, OLYMPUS P/L, ITALSAT, SICRAL), from 1990 till 2000 he was Project, Technical and Validation Manager of several Ground Segment. From 2000 till today is was involved in several program as Head of Communication Systems Unit, Head of Connexion Unit (Antenna Directorate), Head of System Interfaces Unit (Antenna Directorate), Operations, System Integrated Logistic &Site Engineering Segment Manager of Cosmo-Skymed Program. Moreover he is Program Manager for EU and IT.
Role in G-MOSAIC: Program Manager.

Name: Daniele Frasca.
Present job and responsibilities: Actually responsible of the Information Security and ITSEC/Common Criteria evaluation aspects of the Cosmo Skymed Ground Segment, in 1995 he joints the Italian National Defence Department (RUD- INFOSEC) as Information Technology Security researcher. In 1998 become Responsible of the Information Security of the Naval Integrated Telecommunications System in Marconi Communications S.p.A and in 2001 he becomes Head of the Information Security in Information Communication System Department in ALENIA SPAZIO S.p.A. He joints Alenia Spazio in 2002 as Head of the Information Communication System Department. From 2005 he to work on SecurSME Project as program responsible.

14	Thales Alenia Space France	France

Company Profile
Thales Alenia Space – France (TAS-F) is the French company belonging to the Space Division of Thales group.
TAS-F main activities cover space systems, including satellites, instruments, Ground Segments and Information Systems, for Observation and Science, Telecommunication, Navigation, and GMES applications.

Main Roles in G-MOSAIC

In the current proposal, TAS-F contributes to the activity line "Modeling GMES Security Sustainability", acting on Work Packages "Service interoperability standards and models", and "Common gateway for service delivery", as detailed below :

- taking input from Cross cutting aspects in GMES Security services and CONOPS schemas , TAS-F will focus on the analysis of all technical interoperability issues impacting future solution (service architecture for security), and will define the recommendations / rules (standards, compliance with major initiatives, …) applicable to successor WPs : WP5300 Service Architecture Modelling for Security Delivery, 5400 Common gateway for service delivery, 5700 Service Architecture for Security evaluation;
- TAS-F will then contribute to demonstrate new capabilities provided by emerging interoperability standards, through prototypes implementation of common gateway for service delivery.

Relevant previous experience
TAS-F has been involved in several important projects related to GMES programme in particular projects on information systems for Risk management : TAS-F coordinates the WIN project, of which goal is to define and to develop a generic Services Oriented Architecture for risk management ; interoperability issues are drivers for WIN project and for the generic architecture and solution that has been defined ; TAS-F is involved in various other projects like LIMES, BOSS4GMES, HALO where TAS-F contribution is focused on architecture and infrastructure of information system.

Key Staff Members of G-MOSAIC
Name: Christian Alegre.
Present job and responsibilities: WIN project manager.
Work experience: Technical coordination, Specification and Validation of complex system.
Role in G-MOSAIC: TAS-F activity coordination, within WP 4500 definition of transition views.

Name: Cécile Monfort.
Present job and responsibilities: WIN technical officer.
Work experience: Technical requirements, Service Oriented Architecture, System Validation.
Role in G-MOSAIC: within WP 4500 Interoperability issues analysis and requirements in relation with Architecture modelling.

Name: Hugues Sassier.
Present job and responsibilities: ICT technologies and innovation expert.
Work experience: Technical coordination , Service Oriented Architecture, Prototyping.
Role in G-MOSAIC: TAS-F WP 5400 activity in particular prototype specification.

15	**Arsenale Novissimo (AN)**	**France**

Company Profile
Arsenale Novissimo is a corporate communications and public relations company founded in 1999 by Vincent Chabant (Managing Partner) and Charles-Henri Gros who have between them over 35 years of experience in this field.
Arsenale Novissimo applies its expertise to the raw material of its trade: information, which it refines, enriches and, finally, disseminates.
Arsenale Novissimo works for the benefit of its clients by making fullest use of one of the essential tools of management: communication. The company's clients originate in a diverse range of private and public sectors, and the company is usually entrusted with three different types of mission: Advisory services in communication strategy, Organisation of events, Design and publication of printed material (annual reports, brochures, magazines and news media).
Arsenale Novissimo's clients include : Local Council (*Conseil Général*) of the *Bouches du Rhône* (France), Local Council (*Conseil Général*) of *Yvelines* (France), RATP (Paris Public Transportation Authority), EDF (Electricity utility), SNCF (French National Railways).
Arsenale Novissimo has significant experience of communicating in the EC sphere, as it was responsible for creating and organising (with funding from the DG REGIO) an international trade show on the attractiveness of locating businesses on territories across Europe.

Main Roles in G-MOSAIC
Development of the Communications Strategy and Action Plan, Development and Production of the relevant Dissemination tools, Supervision of Communications/Dissemination activities.

Relevant previous experience:
Arsenale Novissimo has been involved in Earth Observation and GMES activities since 2002.
BOSS4GMES (since 12/2006): Leader of the Communications and Training activities work package.
ESA (2002-2003): Communication strategy and organisation of events, such as seminars for the Earth Observation Directorate.

Key Staff Members of G-MOSAIC

Name: Charles-Henri Gros.
Present job and responsibilities: Partner.
Work experience: Born in 1968. He is a graduate of Oxford University's Grandpont House (1986). After being responsible for direct marketing actions with Groupe Hersant (Newspapers and Magazines, 1989-1991), he became an independent consultant (1989-1991) before joigning Euro2C (Communications Agency, 1990-1998) as Senior Consultant (1992-1999).
Role in G-MOSAIC: Communications Strategy, Communication tools.

Name: Stéphane Ourevitch.
Present job and responsibilities: Senior Consultant.
Work experience: Born in 1959. He is a graduate of "Institut d'Etudes Politiques de Paris" (1982) and holds an MBA from INSEAD (1991) as well as a doctoral degree in Defence Studies from the Paris I University. He has worked in Marketing, Business Development and Communications at Dassault Electronique, a major French Aerospace and Defence company from 1985 to 1998 before becoming a consultant. He has also been a research fellow at CREST (Ecole Polytechnique) a French research organization specialized in defence studies, as well as Chairman of "Centre d'Etudes et de Prospective Stratégique" one of France's leading think tanks in the field of Defence and Aerospace.
Role in G-MOSAIC: Communications Strategy, Communication tools, Communication Activities.

16	Astrium SAS	France

Company Profile
Astrium is a world leader in the design and manufacture of satellite systems. Its activities cover complete civil and military telecommunications and Earth observation systems, science and navigation programmes, together with avionics and a wide range of space equipment and associated ground infrastructure. In all these fields, Astrium has an impressive track record.
Within Astrium, the main mission of the Ground Systems, Applications and Services Business Unit is to develop the business based on ground infrastructures and the sales of data and services derived from space applications for Earth Observation and Communication Networks. The Business Unit is also responsible for developing the ground systems needed to develop and control satellites both for Astrium internal use and for external customers.

Main Roles in G-MOSAIC
Astrium main's role is to contribute in a common gateway allowing service providers and users to easily access to data and added value products used and developed during the project. Astrium provides also mobility equipment for on the field demonstrations. Astrium is involved in WP 2100 and 3100.

Relevant previous experience
Astrium has recently been or is currently involved in several large European projects dealing with security aspects. Astrium has extensive expertise in technologies which are vital to ensure that the security systems planned at a European level are fully effective. The company has developed complete, end-to-end solutions for satellite-based telecommunications, observation and navigation to meet the needs of in-theatre operations. These integrated solutions provide not only the system aspect (space and ground segments) but also the services element, covering areas such as mapping and communications. Among the projects coordinated by Astrium, one can mention:

- **ASTRO+** which is part of the EC Preparatory Action for Security Research (PASR) initiative. ASTRO+ was designed to demonstrate how space technologies can enhance the security of Europe's citizens. A security situation simulated in Poland in February 2006 demonstrated how ASTRO+ can support the requirements of operations on the ground by facilitating access to data from satellites.
- **PREVIEW** is an EC FP6 Integrated Project which aims at developing new geo-information services for atmospheric, geophysical and man-made risk management on a European level. PREVIEW is a user-driven project led by European Civil Protection joined to form the User Task Force with the fully active involvement of France, Germany, Italy, Spain and Sweden.
- **TANGO** "Telecommunications Advanced Networks for GMES Operations", a three-year European Commission (EC) programme which objectives are to develop, integrate, demonstrate and promote new satellite telecom services dedicated to GMES requirements. TANGO is the first project under EC FP6 focusing on the use of satellite telecom to serve the needs of the whole GMES community.

Astrium is also playing a key role in two projects dedicated to security, namely:

- **MARISS** (European Maritime Security Services) which aims at setting up maritime and coastal monitoring services to support European institutional clients, such as navies, coastguards, interior ministries and Frontex.
- **LIMES (**Land and Sea Monitoring for Environment and Security) which is Europe's biggest research and development project for the use of space technologies for security.

Key Staff Members of G-MOSAIC
Name: Fabrice Levy.
Present job and responsibilities: System Engineer EO GS Engineering division.
Work experience: Fabrice LEVY has joined Astrium in 2002, as member of Astrium Ground Segment & Application Directorate. He is an expert in Earth Observation image processing. As such he is responsible for the elaboration of architectural concept for GMES service systems as well as for Ground infrastructure proposals and early definition studies, especially for what concerns Earth Observation military and civil systems.
Role in G-MOSAIC: Coordinate Astrium tasks on G-MOSAIC.

17	**Infoterra UK Ltd**	**Great Britain**

Company Profile
Infoterra is a wholly owned subsidiary of EADS Astrium Services, specialising in the application and management of geospatial information and providing an end to end data service from collection through processing and analysis to hosting and dissemination. Core competencies include the acquisition and processing of data from both satellite, aerial and ground platforms, through a variety of sensors including optical, hyper-spectral, thermal and LiDAR. The company also provides data management solutions and GIS development to complement the collection of data.

Main Roles in G-MOSAIC

- Is the leader of the services in support of intelligence and early warning (WP2000). As member of the Executive Board, Infoterra is also involved in cross cutting aspects in GMES security services.
- Processing and analysis of EO optical multi-spectral imagery for the detection of illegal logging activity in the Democratic Republic of Congo;
- Defining the standardisation of a common data repository
- Development of a common portal to enable seamless access to data and products derived by the G-MOSAIC service chains. Standardising of output products to OGC compliant formats and serving the information to allow distributed access.

Relevant previous experience
Infoterra has been a key player in the GMES initiative from the outset offering its expertise in several related projects including RESPOND and Boss 4 GMES. Infoterra has extensive experience in the field of photo-interpretation. It routinely analyses data from a range of different sources for customers and derives information or other forms of geospatial data from it.
Infoterra has provided a geographic information hosting service on behalf of the UK government department DEFRA to allow the accurate capture and description of crop and farming areas. The state of the art hosting facility run from Infoterra supports the dissemination of products via OGC and be-spoke interfaces, to the public as well as secure delivery to government agencies.

Key Staff Members of G-MOSAIC

Name: Mark Curtis.
Work experience: Technical Manager for Software group, Design and implementation of Infoterra Hosting centre, Technical Manager of various EO related Projects (ERS1-PDS, ERS2 and Envisat, as well as in-house solutions).
Role in G-MOSAIC: Technical Co-ordinator.
Name: Ross Elliott.
Work experience: Senior Engineer on Infoterra Server technologies – concentration on Image and Vector serving as well as OGC Standard implementation.
Role in G-MOSAIC: Design/Software Engineer.
Name: Tom Lankester
Work experience: Systems engineer and geospatial consultant involved in the development of EO data production and open standard dissemination services.
Role in G-MOSAIC: Geospatial consultant for open standard Web services.
Name: Jonathon Shears
Work experience: Astro + lead and Defence and Security Account Manager
Role in G-MOSAIC: Project Management and co-ordination activity
Name: Tim Buckley.
Present job and responsibilities: Defence and Security Business Development.
Work experience: Various defence related EO/geospatial projects.
Role in G-MOSAIC: Co-ordination of INFOTERRA UK work.

18	**Infoterra GmbH**	**Germany**

Company Profile
Infoterra GmbH, Germany, holds the exclusive commercial exploitation rights for the new German radar satellite TerraSAR-X, and will supply weather-independent, high-resolution, new-quality data as well as a variety of radar-based geo-information products after the satellites´ launch June 2007. Currently, the company is preparing the distribution of TerraSAR-X data by establishing a global partner network.

Main Roles in G-MOSAIC
Infoterra GmbH will contribute to the WPs 2400 (Critical Assets) and 3200 (Planning for Crisis). In addition, Infoterra GmbH is leader of WP 2600 (Routes and Borders).

Relevant previous experience
Infoterra GmbH has gained a leading role within the European GMES (Global Monitoring for Environment and Security) Initiative of European Space Agency (ESA) and European Commission (EC), leading international project consortia in an ESA GMES Service Element (GSE) project and an EC Integrated Project within the 6th Framework Programme (FP-6 IP).
Crisis Management:
- Risk Management: IP PREVIEW (FP6 – INFOTERRA FRANCE), GSE RISK-EOS II (INFOTERRA FRANCE): "Rapid Mapping";
- Humanitarian Aid: GSE RESPOND (Infoterra UK): "Infrastructure mapping".

Land Monitoring:
- IP geoland (ITD):"terrain mapping", "change detection", "vegetation / soil / trafficability";
- GSE Land (ITD): as above.

Cross Cutting:
- IP BOSS4GMES (Infoterra UK): "infrastructure interfaces";
- IP TANGO (AST-F lead): "communication requirements of GMES Land activities" (ITD);
- GSE Service Evolution (Scisys): "land", "crisis" service evolution outlook (Infoterra UK , INFOTERRA FRANCE, ITD);

Key Staff Members of G-MOSAIC

Name: Dr. Marc Mueller
Present job and responsibilities: Project Manager Geo-information – Risk Management Services
Work experience: Since August 2006 at Infoterra GmbH. Worked before at the University in the field of remote sensing, GIS, risk management and land cover
Role in G-MOSAIC: Coordinating the Infoterra GmbH contribution.

19	Technische Universität Bergakademie Freiberg (TUBAF)	Germany

Company Profile
TU Bergakademie Freiberg is with its 4,500 students and a total staff of 1.150 the smallest of the technical universities in Saxony. Founded in 1765, the university interlinks modernity and tradition today. Research and education take place in the different fields of engineering sciences, geosciences, natural sciences and mathematics as well as economics and business administration. The Working Group Photogrammetry/ Geomonitoring concentrates on the analysis of commercial satellite imagery for treaty monitoring applications. With regard to nuclear safeguards purposes, change detection and classification procedures are being developed and implemented.

Main Roles in G-MOSAIC
Contribution to WP 2200 "Proliferation and treaties": extraction of thematic and geometric 2D/3D information, change detection.

Relevant previous experience
The working group Photogrammetry/Geomonitoring is involved both in GMOSS and LIMES. In GMOSS, Freiberg is partner in the work packages on "Treaty Monitoring" and "Change Detection" and responsible for the coordination of the test case "Iran". Within the Lime project, Freiberg is involved in the work package "Treaties Monitoring".
Since 2000, Irmgard Niemeyer acts as a Satellite Imagery Analysis Expert within the Support Programme of the Federal Government of Germany to the International Atomic Energy Agency (IAEA). Freiberg received the GMOSS Integration Award 2006 and the GMES Definiens Research Award in 2007.

Key Staff Members of G-MOSAIC

Name: Irmgard Niemeyer.
Present job and responsibilities: Junior Professor, Head of Working Group Photogrammetry/ Geomonitoring.
Work experience: Satellite Imagery Analysis Expert of the German Support Programme for the International Atomic Energy Agency (IAEA) since 2000, GMOSS researcher, LIMES researcher, research and teaching in remote sensing, digital image processing and geoinformatics.
Role in G-MOSAIC: Contribution to WP 2200.

Name: Prashanth Reddy Marpu.
Present job and responsibilities: Research associate.
Work experience: GMOSS researcher, LIMES researcher, research in remote sensing and digital image processing.
Role in G-MOSAIC: Contribution to WP 2200.

20	Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek (TNO)	The Netherlands

Company Profile
Defence and Security is one of the 5 core activities of TNO; approximately 1000 people are working in this core activity, for both military and civilian customers. TNO's involvement with Defence covers a range of activities: military operations, military equipment, command & control and operational decision making, threat and protection, instruction and training. In the area of Security and Safety, the emphasis lies on combating crime, calamity and terrorism. There are excellent collaborations with the defence industry and with small and medium-sized enterprises to develop innovative solutions. TNO has a strong interest in the EU Framework Programme (FP). The application oriented and policy supporting characteristics of the programme fit TNO's mission and objectives very well. In addition, many of the priorities in the programme are very similar to the goals in TNO's strategic research agenda.

Main Roles in G-MOSAIC
TNO will assist in the development of different service chains with MR/HR/VHR SAR change detection technology. It will also assist in the integration and fusion of its outputs with geospatial information from other EO sources and context. Technology will include SAR pre-processing (automatic co-registration of images to reduce false alarms, speckle suppression), detection of changes, false alarm reduction, and geospatial information processing.

Relevant previous experience
TNO acts as a European Commission partner, offering its expertise and capacity to help solve European problems and to support the Lisbon goals. Besides FP involvement, TNO receives contracts from the Commission to support Commission policies. TNO participated in 184 FP6 projects. In the Preparatory Actions for Security Research TNO participated in 11 projects. Examples of FP5 and FP6 projects in which TNO has been and still is involved include PRESENSE, ARC, VITA, GMOSS, and TANGO. TNO has developed the airborne HR SAR system PHARUS that was operational between 1995-2001.

Key Staff Members of G-MOSAIC

Name: Rob Dekker.
Present job and responsibilities: Scientist and project management.
Work experience: M.Sc. in geographical information systems, Vrije Universiteit Amsterdam, 2003. B.Sc. in electrical engineering, Hogeschool Rotterdam, 1990. Since 1991, he has been with TNO, where he has worked on SAR signal and image processing, image intelligence, surveillance, automatic target detection and recognition, change detection, and geographical information systems. He has been and still is actively involved in the FP5 and FP6 security projects PRESENSE, ARC, GMOSS, and TANGO.
Role in G-MOSAIC
Participation of TNO within G-MOSAIC will be co-ordinated by Rob Dekker.

21	Consiglio Nazionale delle Ricerche (IMAA)	Italy

Company Profile
The Institute of Methodologies for Environmental Analysis (IMAA) is an institute of the Italian National Research Center (CNR). Its research focuses on information and communications technologies (e.g. Spatial Data Infrastructures) to harmonize, manage and share Earth and Space Sciences resources (i.e. data and services) in the framework of Information Society applications. IMAA is heavily involved in the GMES initiative at the National and International level. IMAA-CNR is an Operational Center of the Italian Civil Protection. It takes part in the INSPIRE initiative and it is a member of the OGC (Open Geospatial Consortium).

Main Roles in G-MOSAIC
IMAA acts in the project as contributor to WP 4500 (Information Exchange: mapping and data exchange standards). In particular it will provide main contributions to: a) Standards for Earth Observation data; b) Monitoring compliancy to agreed standards (EO data); c) Contribute to reporting.

Relevant previous experience
IMAA gained specific knowledge and experience on international tools and standard related to Earth and Space Sciences data access and interoperability, such as: OPeNDAP, THREDDS, netCDF, ncML and GML. IMAA has contributed to several middleware specifications, such as: UNIDATA THREDDS, ncML and ncML-GML. IMAA participates in several international projects like the 6FP projects: GRIDCC, EURORISK/PREVIEW, GMOSS, NEEDS, CYCLOPS. IMAA is the initiator (along with UCAR, NASA and George Mason University) of the OGC Interoperability Experiment GALEON, which aims ad experimenting the OGC WCS to implement Earth Sciences and GIS communities interoperability. IMAA with the Ministry of Environment and the Department of Civil Protection promoted the INSPIRE INTERO SDIC (Spatial Data Interest Community). IMAA is one of the proposing organizations of the FedEO Pilot Response to the GEOSS Architecture Implementation Pilot-CFP (proposal led by ESA).

Key Staff Members of G-MOSAIC

Name: Stefano Nativi.
Present job and responsibilities: researcher at the IMAA. He is in charge of the Earth and Space Science Informatics Laboratory of IMAA – CNR. Point of contact of the GEOSS Interoperability Process Pilot Project for GBIF (Global Biodiversity Information Facility) systems. Member of the "Metadata Core Drafting Team" fo the Implementing Rules of the INSPIRE (The Infrastructure for Spatial InfoRmation in Europe) initiative. Representative of PIN – University of Florence and IMAA-CNR with the Open Geospatial Consortium (OGC). National delegate of DGIWG Imagery Project Co-PI of GALEON Interoperability Experiment of OGC (Open Geospatial Consortium).
Work experience Twelve years experience in Advanced Techniques for interoperability of Earth Sciences Systems and Earth Observation techniques at the microwave regime. Professor, for the University of Florence at Prato to teach: "Web services management" for the Information Engineering degree. Professor for the University of Padua to teach: "Systems for land management" for the Informatics degree.
Role in G-MOSAIC: Expert in EO and geospatial information standards.

Name: Paolo Mazzetti.
Present job and responsibilities: researcher at IMAA.
Work experience: Ten years experience in design and development of infrastructures and services for geo-spatial data sharing. Professor in charge of the course "Telematics" at the University of Florence at Prato for the degree in Information Engineering. Member of the Italian Interuniversity Consortium for Telecommunications (CNIT).
Role in G-MOSAIC: Expert in EO data sharing services.

22	Università degli Studi della Basilicata (UNIBAS)	Italy

Company Profile
The Dipartimento di Ingegneria e Fisica dell'Ambiente (DIFA) is a department of the University of Basilicata (Italy). It is located in Potenza. Within the Department the main activities of the Research Group on Remote Sensing and of LADSAT (Satellite data Analysis Laboratory) lab are focused on satellite remote sensing of atmospheric and surface parameters important for natural, technological and environmental hazards forecast, monitoring and assessment. Since 1998 a new change detection technique has been developed (named RST) which has been successfully applied to detect and monitoring hot-spots (wildfires, lava-flows), cloud (volcanic and meteorological), low-level thermal anomalies (possibly related to impending volcanic and seismic activity), soil moisture (for floods monitoring and forecast), air and water pollution, soil contamination. In the framework of the GMOSS NoE funded by EC within the FP6-GMES initiative, the same approach has been successfully applied to detect hot spots related to accident or sabotage to infrastructures like pipelines, bone-fires revealing movement of population, and other security related events. In GMOSS DIFA was leading the WP2500 on Early Warning.

Main Roles in G-MOSAIC
Use of Robust Satellite Techniques (RST) applied to high (from hours to minutes) temporal resolution satellite data for real time detection of events potentially dangerous for civil population and basic infrastructures. In particular the problem of monitoring infrastructures for energy supply to Europe will be addressed in the framework of WP2400. Support on training and dissemination activities will be also given.

Relevant previous experience
DIFA (UNIBAS) has a long-term experience in security related projects which has been consolidated in a number of international projects (funded within the FP6, EC INTAS and NATO-Security through Science Program) (2006-2007) and particularly in the recent GMOSS FP6 – NoE.. In GMOSS the main role of DIFA was leading the WP2500 on Early Warning and contributing to several WPs dealing with Infrastructure Monitoring, Population and Borders monitoring, training and dissemination.

Key Staff Members of G-MOSAIC
Name: Valerio Tramutoli.
Present job and responsibilities: Head of LADSAT Laboratory at DIFA, Researcher and Aggr.te Professor at the University of Basilicata.
Work experience: Coordinator and PI in several National and International Project supported by ASI, EC, ESA, NASA, NATO, CNRS, etc.
Role in G-MOSAIC: UNIBAS Proposal Manager.

Name: Francesco Marchese.
Present job and responsibilities: PhD, Researcher at DIFA is in charge of the receiving station and archiving and processing chain for MSG-SEVIRI at DIFA premises.
Work experience: Staff member as full researcher in GMOSS NoE.
Role in G-MOSAIC: NRT hot spot detection by using RST method on MSG-SEVIRI data.

Name: Giuseppe Mazzeo.
Present job and responsibilities: PhD student at DIFA.
Work experience: Staff member as PhD student in GMOSS NoE.
Role in G-MOSAIC: NRT detection of hot spot by using RST method on optical satellite data.

Name: Daniele Casciello.
Present job and responsibilities: PhD student at DIFA.
Work experience: Staff member as PhD student in GMOSS NoE.
Role in G-MOSAIC: NRT detection of oil leakages and oil spills by using RST method on optical satellite data.

24	Eurosense Belfotop N. V. (EUROSENSE)	Belgium

Company Profile
EUROSENSE is a prominent commercial and highly specialized remote sensing organization, existing since 1964. It has profound experience in a wide range of domains and has local offices in 10 European countries.

Main Roles in G-MOSAIC
Based on its experience, EUROSENSE is involved in the roll-out and the demonstration of services in the "extended routes" and the "critical assets" WP's.

Relevant previous experience
EUROSENSE' reference list in security related projects (e.g. for the military of Slovakia, France, Belgium and Hungary, FP6 LIMES project) is extensive. EUROSENSE is and was involved in several FP EC and ESA GMES (e.g. LIMES, GSE-Land, Risk-EOS) and PASR (GEOCREW & BSUAV) projects.

Key Staff Members of G-MOSAIC

Name: Ides Bauwens.
Present job and responsibilities: Project manager "Remote Sensing Applications".
Work experience: Master of Science in Bioscience engineering (Land and Forest Management), research experience in the remote sensing domain as a scientific assistant at the University of Leuven; project engineer & manager in Eurosense.
Role in G-MOSAIC: Project manager for G-MOSAIC.

Name: Walter Dewispelaere.
Present job and responsibilities: EUROSENSE production coordinator & quality manager.
Work experience: Agricultural engineer and active in the RS domain for already more than 30 years.
Role in G-MOSAIC: Eurosense. Senior project manager & quality control in G-MOSAIC.

26	**Luiss Livera Università internazionale degli studi sociali Guido Carli**	**Italy**

Company Profile
Luiss Guido Carli is an internationally well-known and highly qualified independent University with legal status, established in 1976 by a consortium of private and public companies and institutions. The University is articulated in main research and formation departments among which, Luiss Business School operates in post graduates training and research activities. It has been involved in several implementation projects in the framework of multilateral and bilateral co-operation initiatives and also in technical assistance programs, covering different areas. Through a multi-area structure Luiss Business School offers consulting and training services to ministries, local and regional administrative bodies (and other relevant institutional decision-making bodies as a whole), public and private companies, associations, etc.

Main Roles in G-MOSAIC
Identification of key stakeholders, procurement schemes, and cost drivers in modelling economic scenarios for security services.

Relevant previous experience
Some of the **most important projects** awarded by Luiss are:
involved in WP 4 of the **BOSS4GMES** Project, funded under the European 6th Framework Program;
analysis of the Italian Fashion Industry, research financed by the Italian Minister of Industry;
analysis of the Italian Real Estate Industry;
establishment of the Observatory on the Mobile Internet to detect different business models in the Italian TLC industry;
analysis of the Aerospace Industry in Lazio Region;
identification of clusters inside the Aerospace Industry;
Galileo Payload for COMmunication (GAPACOM): research and development project funded by the Italian Ministry of Research and University 2007-2009.

Key Staff Members of G-MOSAIC
Name: Franco Fontana.
Present job and responsibilities: Director of Luiss Business School.
Work experience: Full professor of corporate strategy and coordinator of the team for several research projects (e.g. BOSS4GMES, Analysis of the Italian Fashion Industry, Observatory on the Internationalization of Lazio, Analysis of Italian Real Estate Industry, Analysis of clusters in the Aerospace Industry, Galileo Payload for Communication).
Role in G-MOSAIC: Coordinator.

Name: Lucia Marchegiani.
Present job and responsibilities: Post-doc Research Fellow at Luiss University.
Work experience: Member of the team for the following projects: BOSS4GMES (6th Framework Program), Analysis of the Italian Fashion Industry, Mobile Internet Observatory, Observatory on the Internationalization of Lazio, Galileo Payload for Communication.
Role in G-MOSAIC: Senior Researcher on business and organizational modelling.

Name: Enzo Peruffo
Present job and responsibilities: Post-doc Research Fellow at Luiss University
Work experience: Member of the team for the following projects: BOSS4GMES (6th Framework Program), Observatory on the Internationalization of Lazio, Analysis of Italian Real Estate Industry, Analysis of clusters in the Aerospace Industry, Galileo Payload for Communication Project.
Role in G-MOSAIC: Senior Researcher on financial topics.

Name: Luca Pirolo.
Present job and responsibilities: Post-doc Research Fellow at Luiss University.
Work experience: Member of the team for the following projects: BOSS4GMES Project (6th Framework Program), Analysis of the Italian Fashion Industry, Observatory on the Internationalization of Lazio, Galileo Payload for Communication Project, Urban clusters and competitiveness.
Role in G-MOSAIC: Senior Researcher on business and organizational modelling.

27	**Skysoft Portugal, Software e Tecnologias de Informação, S. A. (SKYSOFT)**	**Portugal**

Company Profile
Skysoft Portugal is a systems and software house, located in Lisbon, with over a decade of experience in the aeronautics, space, security, defence and telematics markets. It currently counts with a staff of around 80 people and a business turnover of over 5Meuros.

Main Roles in G-MOSAIC
WP3100 related contribution :

- ccontribution to Consular Crisis case (S2) by addressing repatriation of EU citizens for the case of Angola;
- establish links with Portuguese foreign ministry as key user, and support scenario definition, and review service specification;
- running the service case for areas in Angola in which Portuguese workers are present;
- establish user feedback for the Angola case.

WP3200 related contribution :

- contribute to image selection / pre-processing (co-registration) and provision of additional geo-spatial info (for some defined areas). Contribute to plans update (previous tasks, change detection and ancillary data update).

Contribution to WP2400.

Relevant previous experience
Skysoft has contributed to numerous projects addressing earth observation techniques and is active in the security and crisis management research area. Some of the relevant projects in which Skysoft has participated are:

- MARISS: ESA's GMES initiative project aimed at fusion of sea surveillance information from VTS, AIS, and Satellite EO for security purposes, such as clandestine immigration and illegal traffic control;
- MARCOAST: ESA's GMES initiative project aimed at preventing and detecting oil or pollution spills in the oceans;
- PROMOTE – The GSE atmospheric service portfolio demonstration, funded by ESA;
- IASI – Level 2 Processor – supply of the level 2 data processor for Eumetsat EPS CGS;
- CITRINE: EC PASR project addressing the development of a tactical and strategic level support system for crisis management;
- ASTRO+: EC PASR project addressing the use of space based assets to support security civilian operations;
- MACAIS: Development and deployment of an integrated sea surveillance system composed of a GIS C2 system and 13 AIS shore station at the Madeira and Azores Islands for the Port Authorities and Portuguese Navy (for SAR operations).

Key Staff Members of G-MOSAIC
Name: José Neves.
Present job and responsibilities: José is currently responsible for the operational coordination and business development activity of Skysoft's Aeronautics, Security and Defence (ASD) department.
Work experience: He has over 10 years experience in the aerospace field, having been a project manager for numerous ESA related contacts, including the MARISS and MARCOAST projects, as well as research projects for crisis management.

Role in G-MOSAIC: Project Manager.

28	Instituto Superior Técnico (IST)	Portugal

Company Profile
Instituto Superior Técnico (IST), the Engineering School of Lisbon Technical University is Portugal's main Engineering School with about 7000 undergraduate students and 2000 graduate students. Research activities IST are organized into Research Centers and Institutes. MARETEC is IST's multidisciplinary research centre, coordinated by Prof. Ramiro Neves (www.maretec.mohid.com and www.mohid.com). Maretec's main activities are numerical modeling applied to aquatic environmental problems, monitoring and data management.
Maretec's financial resources are consulting services (private and institutional) and research projects (15 funded by EU programs). Research products developed by Maretec include the modeling systems MOHID LAND and MOHID WATER and data-acquisition systems.

Main Roles in G-MOSAIC
Integrated water resources modeling for improved operational management.
Development of indicators.

Relevant previous experience
IST has wide experience in the development and application of modeling tools dealing with water related problems. Integration of EO data both on land and in coastal applications is another strong point. Regarding watershed modeling, IST developed MOHID Land, emphasizing Mediterranean river catchment areas, and focusing on semi arid hydrological regimes. This has been considered an important breakthrough since most existing models were developed for permanent streams and rivers. This model has been successfully validated for several applications. IST is also a very experienced user of the widely known basin model SWAT (developed by the USDA) having developed several applications for Portuguese companies and in the framework of EU-funded projects (Ecomanage, ICREW,TempQSim). IST's expertise in these subjects was recently recognized by ESA (European Space Agency). IST was selected to develop Aquapath in Portugal, an application under GMES Service Element (Land) leaded by the German company InfoTerra. The primary objective of the project is to provide the end-users with services that enable a thorough assessment of water quality and quantity within watersheds.

Key Staff Members of G-MOSAIC
Name: Ramiro Neves.
Present job and responsibilities: Associated Professor. Coordinator of Maretec group**.**
Work experience: Supervised 9 PhD theses and more than 15 MSc theses on mathematical modelling. Teaches Fluid Mechanics, Physical Oceanography and Modelling of the Aquatic Environment. Coordinator of EU projects INSEA, ECOMANAGE, EASY and ESA Aquapath.
Role in G-MOSAIC: Coordinator of IST tasks in G-Mosaic.

Name: Pedro Chambel Leitão.
Present job and responsibilities: PhD Student. Senior Researcher.
Work experience: Development and application of catchments models MOHID Land and SWAT
Role in G-MOSAIC: Application of watershed models in operational management and in development of indicators.

Name: Frank Braunschweig.
Present job and responsibilities: PhD Student. Senior Researcher.
Work experience: Software development, include: models, interfaces and geographic information systems. Currently developing operational systems to run models and data management.
Role in G-MOSAIC: Development of operational systems.

Name: Pedro Pina.
Present job and responsibilities: PhD Student. Senior Researcher.
Work experience: integrating numerical models, in-situ data and Remote Sensing data to access water-quality and water-quantity-related problems.
Role in G-MOSAIC: Integrating models, in-situ data and Remote Sensing.

29	Joanneum Research Forschungsgesellschaft m.b.H.(JR)	Germany

Company Profile
Joanneum Research, with its highly qualified staff of more than 350 employees working in 14 research institutes is one of the most important focal points of scientific research and economy in Austria. The Institute of Digital Image Processing (JR-DIB) is internationally recognised as a centre of excellence in the fields of image processing, image analysis, mobile mapping, and remote sensing. The Institute currently has a staff of 45 persons, the majority having academic degrees in computer science, mathematics, telematics, geosciences, and engineering. Its facilities comprehend high-performance computers as well as extensive image analysis, vision, robotics, remote-sensing and computer-graphics equipment and software libraries.
The Remote Sensing and GIS Department engages 20 academic members and is Austria's largest remote sensing and GIS laboratory. The department consists of expert groups working on pattern recognition and geometrical processing. It is engaged in processing of sensing data from both active and passive sensors, laser scanner data and in developing algorithms for the classification of natural resources, landscape structures, and traffic infrastructure.

Main Roles in G-MOSAIC
Against the background of expertise JR-DIB will be involved in the following building blocks for different security applications:

- 3D – Object reconstruction (stereo satellite – airborne – optical – radar), examples: nuclear power plants;
- 2D/3D Change detection (ships, airplanes).

Relevant previous experience
Within FP 6, ESA projects and projects on national level we are strongly involved in developing algorithms and methods for different processing steps relevant for applications in the field of security, which are LIMES; GMOSS; Implementation of Value Adding Processors for TerraSAR-X; KuXSAR (Austrian Ministry of Innovation and Technology); ESA GPOD; PUKIN (Austrian Ministry of Innovation and Technology).

Key Staff Members of G-MOSAIC

Mathias Schardt: Head of the Institute of Digital Image Processing at Joanneum Research and head of the Institute of Remote Sensing and Photogrammetry at the Technical University Graz. He has more that 20 years of experience in remote sensing and GIS. Mathias Schardt has a degree (equivalent to M.Sc.) and a Ph.D. in "Forest Science" from the Albert Ludwigs University of Freiburg. 1997 Mathias Schardt finished his habilitation in the field of "Landscape Planning, Remote Sensing and GIS" at the TU Berlin. He is lecturer at the TU Berlin, TU Graz and the Karl-Franzen-University for "Remote Sensing, GIS, Environmental Monitoring and Digital Image Processing".

Karlheinz Gutjahr: Senior scientist in the Remote Sensing Department of JR-DIB. He has a master degree and a Ph.D. in geodesy from the Technical University of Graz and can refer to 10 years of experience in remote sensing with emphasis on geodetic engineering, geometric processing of remote sensing data including (differential) SAR interferometry, stereo modelling and DTM generation., as well as the analyses of multi-sensor remote sensing data.

Hannes Raggam: Senior scientist in the Remote Sensing Department of JR-DIB and head of the geometry group. He has a master degree and a Ph.D. in geodesy from the Technical University of Graz and can refer to 20 years of experience in remote sensing with emphasis on geodetic engineering, geometric processing of remote sensing data including geocoding, coregistration, radargrammetry, interferometry, stereo modelling, as well as the analyses of multi-sensor remote sensing data.

30	**Paris London University Salzburg (Universitaet Salzburg) (PLUS)**	**Austria**

Company Profile
An interdisciplinary centre of Paris-London University Salzburg, Z_GIS is dedicated to applied research, outreach activities and professional education and training. It focuses on interoperable GIS usage, spatial modelling, satellite remote sensing, digital cartography and GI-based communication. We utilize cutting edge scientific methods and GI tools for landscape analysis, environmental management and security-related issues, under the guiding principle of sustainable development. We develop generic workflows for effectively transforming complex geospatial data into policy-relevant information. With a strong emphasis on applied research and outreach activities as well as professional training, we ascertain responsible and sustaining usage of new technologies for informed spatial decisions and policy implementation. Our user groups range from local, federal and national governments, to the European Commission and super-national organisations.

Main Roles in G-MOSAIC
Value adding provider – Scientific methods and GI tools for security-related issues embedded in generic workflows for effectively transforming complex geospatial data into policy-relevant information. Land use/land cover mapping production as a basis for the indicator mapping service (WP 2300); Methods for automatic rapid mapping, manual and automated techniques (WP 3300); Data integration, information extraction and spatial change detection, scientific visualisation (WP 3400); standards for geoinformation and security applications (WP 4500).

Relevant previous experience
Interoperable GIS usage, spatial modelling, satellite remote sensing, digital cartography and GI-based communication. We utilize cutting edge scientific methods and GI tools for security-related issues embedded in generic workflows for effectively transforming complex geospatial data into policy-relevant information, i.e. conditioned information. Participation in GMOSS and LIMES. Co-ordination of various capacity building and knowledge transfer projects.

Key Staff Members of G-MOSAIC

Name: Peter Zeil.
Present job and responsibilities: Senior project manager at Z_GIS.
Work experience: 20+ years professional experience in resource management, institution building, technology transfer, regional harmonisation and network building. Executive board member of GMOSS, steering committee member of LIMES.
Role in G-MOSAIC: WP 2300, WP 3300.

Name: Stefan Lang.
Present job and responsibilities: Senior researcher and research co-ordinator at Z_GIS.
Work experience: Specialist in GIS science and remote sensing for urban and environmental applications. His research interests include multi-scale spatial modelling, systems thinking and the understanding of complex environmental and societal phenomena in space.
Role in G-MOSAIC: WP 3400, WP 3300.

Name: Josef Strobl.
Present job and responsibilities: Director of Z_GIS and professor at Salzburg University.
Work experience: Board member of Digital Media Cluster (Austria); UNIGIS Int. Association, Forum New Media (Austria, Chairman); ESRI Virtual Campus (US, Acad. Advisory Board); Board chairman. European Master in GI Science.; Austrian representative to the EC committee on standards and benchmarks in ICT education; leader of several OpenGIS-related projects and standardization initiatives. Director of the Institute for GIS science, Austrian Academy of Science.
Role in G-MOSAIC: WP 4500.

32	Planetek Italia s.r.l. (PLANETEK)	Italy

Company Profile
Planetek Italia is a value added company devoted to GIS and remote sensing data integration.
Planetek experience conjugates mastering of advanced remote sensing processing, with GIS Commercial Off-The-Shelf (COTS) competence and real world application delivery.
Moreover Planetek Italia it is very active in the field of promotion of Earth Observation exploitation and pursue close relation with Education and Research Organization.
Joint development is ongoing with several departments of Bari and Venice Universities in GIS and advanced remote sensing.
In the past years Planetek Italia exploited several operational support activities in the field of design, development and integration of GIS environments, based on market leaders such as ArcGIS and ER-Mapper. Some of these activities have been performed for public administration like local governments and environmental agencies.
Planetek Italia is among the founders of the Italian Small and Medium Aerospace Enterprises Association and member of the Associational Italiana Telerilevamento.
Planetek Italia works in conformance with the International Standards Organisations (ISO) 9001. There is a Quality Assurance manager that reports directly to the Managing Director of the Company.
Planetek Italia has been obtained the ISO9001:2000 Quality Certification by a major certification agent.

Main Roles in G-MOSAIC
WP3200
- Contribution and support to Orthorectification Building Blocks;
- contribution to image processing (Soil Sealing extraction);
- contribution to SAR and Optical VHR processing;

WP5000: Contribution to provide repository to store economic and operational model;
WP5400: Contributor to implementation of platform V1 and V2 tasks WP5620 and WP5630 (Web-GIS interface and integration of external resources).

Relevant previous experience
GEOCREW: Supporting Activity in PASR (Preparatory Action on the enhancement of the European industrial potential in the field of Security research) to analyse the use of geographical date in the field of security.

Key Staff Members of G-MOSAIC

Name: Cristoforo Abbattista.
Present job and responsibilities: responsible for the WEBGIS line of Planetek.
Work experience: Software development, WebGIS, EO data processing and GIS integration.
Role in G-MOSAIC: Project Manager.

Name: Tragni Mario.
Present job and responsibilities: technical management of Software development projects
Work experience: software development, WebGIS, EO data processing and GIS integration.
Role in G-MOSAIC: Technical Manager.

33	Centro di Ricerca Progetto San Marco Sapienza Università di Roma (Università degli studi di Roma la Sapienza) (CRPSM)	Italy

Company Profile
Centro di Ricerca Progetto San Marco (CRPSM) is a research centre of the Sapienza University of Rome. From its very inception, it has been carrying out its activities at Rome and abroad, particularly in Kenya, where the University of Rome has established, and is operating, its Equatorial Ground Segment for Remote Sensing satellite data acquisition and TT&C support operations. It actively pursued joint co-operation programmes with NASA and several Italian/international organizations, such as the ESA, Italian Air Force, National Research Council, ASI, not to mention various universities. The CRPSM is currently engaged in:

- development of applications based on remote sensing and scientific satellite data;
- support operations for scientific and technological programmes carried out at its Telemetry, Tracking, & Command, and Remote Sensing Stations;
- geophysical activities for the equatorial environment monitoring.

Main Roles in G-MOSAIC
To cooperate on the training activities. To work on automatic plants detection using key elements, plants status monitoring using change detection techniques and automatic procedures.
To work on automatic detection of roads and man-made infrastructures and change estimate, night-time images exploitation (WP2400). To cooperate on the study of new satellite based system and orbital concept for a quasi continuous monitoring of an assigned are of the earth, exploitation of the permeability index (introduced in the GMOSS project) for border area patrolling purposes (WP2600).
Relevant previous experience
In the mainframe of the NoE GMOSS (2004-2008) several security related topics have been analyzed: development of techniques for automatically detecting and monitoring man-made infrastructure (including power plants) using morphological approach on mosaics of satellite images. Prompt detection of areas affected by disasters. Early warning based on geostationary satellite or night-time images. Population monitoring (in refugee camps) using automatic techniques. Simulation of scenario for the development of new satellite sensors. Satellite Mission design. Border monitoring.
Key Staff Members of G-MOSAIC
Name: Giovanni Laneve
Present job and responsibilities: Research professor at Aerospace Engineering School of the University of Rome
Work experience: Teacher of the course Aerospace System for Remote Sensing. Development of applications based on satellite data regarding security related topics, disaster management (fire detection, prompt detection of disaster affected areas). Satellite data applications.
Role in G-MOSAIC: Responsible of the CRPSM staff.
Name: Enrico G. Cadau
Present job and responsibilities: PhD student of the Aerospace Engineering School.
Work experience: Development of algorithm for satellite images processing.
Role in G-MOSAIC: Researcher.
Name: Munzer Jahjah
Present job and responsibilities: Research contractor.
Work experience: GIS expert, images classification.
Role in G-MOSAIC: Researcher.
Name: Giancarlo Santilli
Present job and responsibilities: Research contractor.
Work experience: Development of algorithms for the automatic processing of satellite images.
Role in G-MOSAIC: Researcher.
Name: Carlo Ulivieri
Present job and responsibilities: Full Professor at the Aerospace Engineering School.
Work experience: Teacher of the course Aerospace Mission Design. Development of applications based on exploitation of MIR and TIR spectral bands. Satellite mission design.
Name: Giuseppe Russo
Present job and responsibilities: Engineer.
Work experience: Satellite mission design, Telecommunication. GIS.
Role in G-MOSAIC: Researcher.

34	GISAT s.r.o. (GISAT)	Czech Republic

Company Profile
GISAT is privately run SME company providing remote sensing and geo-information services worldwide. Since its beginning the company is committed to applications in the domain of geomatics with specific focus at advanced technology of remote sensing and GIS.
The mission of the company is to provide its clients with wide range of value added, complete, high quality and 'state-of-the-art' geoinformation services based on the Earth Observation technology. GISAT brings to its domestic and international clients complete portfolio of EO based services starting from the one-stop satellite data acquisition and geomatics software distribution, through specialized image and GIS data processing and analysis, up to advanced geoinformation products and consultancy services. Thematically, GISAT is in particular active in environment, agriculture and emergency/security domains.
GISAT is concerned in integration of new remote sensing and GIS techniques within internal company workflows and therefore all methods applied are updated and improved according to the recent developments in the EO domain worldwide and verified in cooperation with both domestic and foreign institutions, such as the European Space Agency (ESA), the European Environmental Agency (EEA), the Joint Research Centre of the EU (JRC), the Czech Academy of Science and dozen of national and European Universities and Research Labs.

Main Roles in G-MOSAIC
GISAT will be involved in several tasks of WP2000 and WP3000 with the focus on advanced EO data processing and analyses.

Relevant previous experience
ISAT has a long-term experience from various GMES activities related to security, emergency response and land monitoring. Selected recent projects include:

- GSE RESPOND (2007-2009) ESA funded project for EO based service for emergency response support;
- GMES FTS Sealing (2007-2008) EEA funded project for service provision of European wide high-resolution core land cover data on built-up areas including degree of soil sealing for reference year 2006;
- GSE Land (2006-2008) ESA funded project for EO based services for land monitoring support;
- MEDSI (2004 – 2005) FP funded project focused on development of an advanced system for support on decisions in a crisis situation.

Key Staff Members of G-MOSAIC
Name: Mr Lubos Kucera.
Present job and responsibilities: Managing director, RS expert.
Work experiences: MSc. In geodesy, cartography and GIS/RS.
Role in G-MOSAIC: Project leader for GISAT contribution, scientific advisor.

Name: Mr Jiri Sustera.
Present job and responsibilities: Head of the Remote Sensing Department, RS specialist.
Work experiences: MSc. In geodesy, cartography and GIS/RS, senior expert in advanced image processing techniques and domain specific applications.
Role in G-MOSAIC: Senior RS researcher.

35	King's College London (KCL)	United Kingdom

Company Profile

Department of War Studies. The Department of War Studies is a multi-disciplinary institution devoted to the study of all aspects of war and conflict. The Department is an acknowledged leader in teaching and research within its specialist areas; it received the highest possible ratings in successive Research Assessment Exercises and scored the highest rating in the last Quality Assurance Agency Subject Review assessment of teaching. A remarkable diversity of research interest, disciplinary approaches, opinion and background exists in the Department among both staff and students, reflecting the variety and complexity of the issues raised by war and the study of war. Staff draw on military and international history, strategic studies, international relations, philosophy, politics, sociology, literature and psychology. Their specialist interests extend across many regions of the world and also across time, focusing on topics ranging from the dynamics of ancient warfare and medieval warfare to human rights, weapons proliferation and intelligence.

King's College London
King's College London is the fourth oldest university in England with more than 13,700 undergraduates and nearly 5,600 graduate students in nine schools of study based at five London campuses. It is a member of the Russell Group: a coalition of the UK's major research-based universities. The College has had 24 of its subject-areas awarded the highest rating of 5* and 5 for research quality, demonstrating excellence at an international level, and it has recently received an excellent result in its audit by the Quality Assurance Agency.
King's has a particularly distinguished reputation in the humanities, law, international relations, medicine, nursing and the sciences, and has played a major role in many of the advances that have shaped modern life, such as the discovery of the structure of DNA. It is the largest centre for the education of healthcare professionals in Europe and is home to five Medical Research Council Centres – more than any other university.
King's is in the top group of UK universities for research earnings, with income from grants and contracts of more than £110 million, and has an annual income of more than £387 million.

Main Roles in G-MOSAIC
To set up, within the "Service case" on WMD (area to be chosen) involving technology solutions (service chains on proliferation/treaty monitoring), some ideas on searching and monitoring plants and surrounding activities with multi resolution data.

Relevant previous experience
Written a report for the UK Department of Space on the use of commercial satellites images for arms control monitoring (1991); played an instrumental role during the establishment of the European Union Satellite Centre (1984-1991); persuaded the IAEA to use commercial satellite images for its safeguards procedures (1996-2000); wrote a report for the UK Foreign Office on the use of such images for monitoring the CWC (2000); have participated in the formulation of the European Space Policy for the European Space Policy Institute (Vienna); and leader of treaty monitoring and Early Warning of conflict and crisis studies (GMOSS, 2003-present).

Key Staff Members of G-MOSAIC
Name: Professor Bhupendra Jasani and Ms Bhavini Rama.
Present job and responsibilities: Jasani: Visiting Professor responsible for two EC studies namely GMOSS and HAWKEYE; military uses of outer space and issues related to WMD; Rama: PhD student.
Work experience: As above.
Role in G-MOSAIC: Participating in WP2100 and WP4100.

36	SYNESYS	France

Company Profile
SYNESYS is a small and independent consulting cabinet specialized in architecture and technologies of interoperability. From the beginning Synesys accompanies ministries involved in a rationalization of their information systems. Synesys has developed methodologies and provided expertise for acquisition of robust and evolutionary information system, mainly in the area of defence and especially in the Network Centric paradigm.
SYNESYS accompanies also major industries in order to analyze their Information System, advocates the way to evolve with the right knowledge of the benefit linked to the new technologies.

Main Roles in G-MOSAIC
- Customization of architecture to integrate interoperability, properties such as services evolution, services interchange, and QoS parameters ;
- definition of test cases and evaluation metrics for architecture evaluation, comparison and recommendations ;
- definition and implementation of consistency checks regarding service and quality of service models.

Relevant previous experience
- AROSYS : The aim of the study was to define methodology "AROSYS" (Architecture Ouverte de SYStème) of acquisition of open systems, in order to guarantee the evolutionarity of the systems from a functional or technical point of view, and to facilitate their integration and their interoperability in a system of systems. This methodology has been defined for French Ministry of Defence. AROSYS defines, amongst other things, a process to evaluate architecture of open systems and another one to compare such architectures.

- AIST : Overall analysis of the need for the human system composed of the French terrestrial forces on the theatre of the operations and the interactions of these forces:

  - with the other French Armies within the framework of inter-army national operations;
  - with the forces allied within the framework of multinational operations, under the angle of the coherence and interoperability of all systems.

- NCW: The purpose of this study was to help the Ministry of Defence to answer the fundamental questions which turn around NCW concept (Network Centric Warfare). The key concepts used to define global architecture were mainly: Concepts SOA (Service-Oriented Architecture), Peer-to-Peer, Grid Computing, Data Grid, fusion of data, distributed real times treatments.

Key Staff Members of G-MOSAIC
- Jacques PRINTZ – Associate – Expert – 40 years experience in information systems.

- Jacques THIBAULT – Senior consultant Architect – 35 years experience in information

  system – main contributor.

37	Adelphi Research GGmbH (Adelphi)	Germany

Company Profile
Adelphi Research was founded in 2001 as a private non-profit research organization on sustainability science and public policy consulting. The mission of Adelphi is to promote high-quality interdisciplinary research by carrying out policy relevant research and public policy consultancy for institutions in Europe and abroad. Adelphi Research specializes in strategic policy analysis, public policy consultancy and dialogue. Areas covered included environment, development, foreign policy, conflict analysis, energy, S&T, and management systems. Strategic policy analysis and development as well as project management and implementation in our key research areas is at the core of the Adelphi Research portfolio. Since 2001 Adelphi Research was involved as key partner and coordinator in more than 50 European and domestic projects for the European Commission, international organizations and domestic institutions in Europe. These included 20 projects in the field of environmental security research.

Main Roles in G-MOSAIC
Adelphi Research supports G-MOSAIC in integrating socio-economic and political data and analysis into the service chains to allow for developing comprehensive methodologies and approaches in the area of crisis early warning. Beyond developing the service chains, Adelphi will also provide integrated policy analysis and expert assessments and contribute to evaluate service chains for use of national foreign policy entities and other relevant stakeholders.

Relevant previous experience
Adelphi Research was engaged in several mapping and assessment projects with regard to environmental security. Among them are mapping of environmentally-related security risks in the Southern Caucasus for UNDP and OSCE; developing early warning indicators for integrated risk assessments for the ENVSEC Initiative; development of a world map and typology of environment-related conflicts for the German Council on Global Change and development of the security diagrams approach to identify the consequences of extreme environmental events especially with regard to climate change. In addition, Adelphi Research is a member of the Conflict Prevention Network funded by the European Commission.

Key Staff Members of G-MOSAIC

Name: Alexander Carius.
Present job and responsibilities: Managing Director, Adelphi Research.
Work experience: 16 years.
Role in G-MOSAIC: Coordination of Adelphi's work, liaising with project partners and providing expert assessment.

Name: Dennis Tänzler.
Present job and responsibilities: Project Manager and Research Fellow, Adelphi Research.
Work experience: 10 years.
Role in G-MOSAIC: Methodology development for crisis indicators and integrated policy analysis.

Name: Achim Maas.
Present job and responsibilities: Research Fellow, Adelphi Research.
Work experience: 2 years.
Role in G-MOSAIC: Integrated policy analysis and providing context-specific data and assessments.

39	SISTEMATICA	Italy

Company Profile
Sistematica Spat is an Italian SME established in Rome and Terni (Umbria) in 1996 by a group of Specialists coming from some of the most important companies in the Space and IT sectors.
The participation – with primary tasks – in many highly complex projects, helped create Sistematica's wide ranging know-how, hard to find in companies of this size. Sistematica is focused on software development and integration for large and heterogeneous systems. Within its spheres of competence (described in detail in the following pages) Telespazio can supply its customers with both "turnkey projects", and highly professional expertise.
Sistematica has significant end-to-end systems implementation experience through the involvement of the Company as a whole, and its resources, in the most important Space Satellite Earth Observation, Telecommunications and Navigation programs.
Sistematica has tackled significant challenges on these global engagements:

- Earth Observation: COMSO-Skymed, I-PAF, SRTM
- Telecommunications: Iridium, Astrolink, EMSAT
- Navigation: Galileo, EGNOS and SSV

Main Roles in G-MOSAIC
WP5400 "Common portal for G-MOSAIC security services": Development of the "Monitor and Control" component.

Relevant previous experience

- Development of several Subsystem of the Cosmo-Skymed Ground Segment:
  - PM (Production Manager) S/S,
  - OSM (Overall Status Manager) SSE,
  - SAPM-FMCS SSE
- Development / upgrade of several components of the I-PAF Ground Segment,
- design & Development of the SRTM processor encapsulators and several SRTM system component;
- implementation of the ESMS System for the management of SMS in the EMSAT network system;
- participation to the Design and Implementation of the S/S OMC-G (Operation and Maintenance Center – Gateway) of the Iridium gateway;
- participation for the Configuration and Deployment of the S/S GBS (Gateway Business System), for the Iridium Gateway in Japan, Taiwan and Brazil;
- participation to the System Engineering Activities related to the Billing Requirements and Astrolink services to be provided during the commercial activation phase.

Key Staff Members of G-MOSAIC

Name: Roberto Ricci.
Present job and Responsibilities: Responsible of the BU "Space and Defence".
Work Experience: Program manager for the PM S/S development, System Designer for TELESPAZIO S.p.A. of the architecture of the UGS. The UGS is the acquisition and processing Centre for COSMO SKYMED (Constellation of Small satellite in the Mediterranean basin Observation), an Italian Space Agency's (ASI) program for earth observation.
Design and development for TELESPAZIO S.p.A. of software for the elaboration and archiving data provided by third Space Shuttle mission.
Role in G-MOSAIC: Project Manager for the Development of the "Monitor and Control" Subsystem.

40	Swiss Peace Foundation (SWISSPEACE)	Switzerland

Company Profile
Swisspeace is a practice oriented peace and conflict research institute. Its main areas of activities are conflict early warning, peace building (conflict sensitivity, dealing with the past, gender), human security, and research on governance and conflict.

Main Roles in G-MOSAIC

WP 2000
"Support to intelligence and early warning"

- Analyze causes leading to regional crises;
- aturit Interaction (conflictive vs. cooperative) between actors;
- doing "Country Risk Profiles" based on in-house expertise plus large networks of local and international experts;
- develop synthetic crisis indicators;
- quantitative forecasting of political developments – this contribution is based on a new methodology and FAST's database with standardized information on 250'000 political events);
- indicators based on network analysis of event data – this contribution is based on the FAST database;
- construction of new indicators to track critical developments – based on FAST database;
- visualization of critical developments on maps – based on geo-coded event data in the FAST database.

Relevant previous experience
- 10 years of experience in developing FAST, the early warning system of swisspeace, which is based on event data analysis;
- collaboration within GMOSS.

Key Staff Members of G-MOSAIC

Name: Heinz Krummenacher.
Present job and responsibilities: Managing Director and Director FAST International.
Work experience: Risk analyst.

Name: August Hämmerli.
Present job and responsibilities: Senior Analyst FAST.
Work experience: Statistician.

Name: Dominic Senn.
Present job and responsibilities: Analyst FAST.
Work experience: Statistician.

Annex A: Reference Documents

Ref #	***Document title***	***Source / reference***
R1	Work Programme 2007 Cooperation Theme 9 – Space	European Commission C(2007) 560 of 26.02.2007 http://cordis.europa.eu/fp7/dc/index.cfm?fuseaction=UserSite.CooperationDetailsCallPage&call_id=38
R2	GSE collocation 5 meeting Report	http://esamultimedia.esa.int/docs/GMES/GSE_Colocation5_Report_V1.2.pdf
R3	"Communication on Conflict prevention",	Communication from the Commission to the Council and the European Parliament, COM (2001) 211 Final. Brussels: Commission of the European Communities
R4	"A Secure Europe in a Better World"	Document proposed by Javier Solana and adopted by the Heads of State and Government at the European Council, 12 December 2003, Brussels
R5	"A Human Security Doctrine for Europe – The Barcelona Report of the Study Group on Europe Security Capabilities"	Presented to the EU High Representative for Common Foreign and Security Policy, 15 September 2004, Barcelona.
R6	"EU Strategy against the Proliferation of Weapons of Mass Destruction",	European Council, 2001 http://register.consilium.europa.eu/pdf/en/03/st15/st15708.en03.pdf
R7	"European Space and Human Security Working Group Report"	European Space Agency, October 2006 See also previous key documents such as : the Council Resolution of 16 November 2000 on A European Space Strategy (2000/C371/02); "ESDP and Space" (11616/3/04 adopted by the Council of the European Union on November 2004; Generic Space Systems Needs for Military Operations (6091/06) from the EU Military Committee; Generic Space Systems Needs for Civilian Crisis Management Operations (10970/065) from the Committee for Civilian Crisis Management;
R8	Research for a Secure Europe, Report of the Group of Personalities in the Field of Security Research	European Communities, 2004 http://cordis.europa.eu/documents/documentlibrary/ADS0003351EN.pdf
R9	Meeting the Challenge: The European Security research Agenda, A report from the European Security Advisory Board	September 2006 http://ec.europa.eu/enterprise/security/doc/esrab_report_en.pdf
R10	EU Programme for the Prevention of Violent Conflicts	European Council, 2001 http://www.eu2001.se/static/eng/pdf/violent.PDF
R11	Regulation (EC) No.1717/2006	EU Parliament and of the Council of 15/11/2006 establishing an Instrument for Stability.
R12	Addressing the Interlinkages between Natural Resources Management and Conflict in the European Commission's External Relations	March 2007, Ecorys Evaluation Consortium (Sector and Project Evaluations, Contract 2006/125136).
R13	Preliminary User Requirements for GMES-like services (for Emergency Response FTS)	EC DG ECHO - DG RELEX document "Preliminary requirements for EU external actions", 16 Jul 2007 http://www.gmes.info/library/index.php?&direction=0&order=&directory=5.%20Implementation%20Groups%20Documents/Emergency%20Response%20Core%20Service%20ERCS Or http://www.gmes.info/174.0.html

Annex B: Acronyms List

AIS	Automatic Identification System
AMESD	African Monitoring of the Environment for Sustainable Development
AoA	Alternatives of Architecture
ARGOS	Data Collection System
AROSYS	Architecture Ouverture de SYStème
ASD	Aeronautics, Security and Defence department
ASI	Italian Space Agency
ASTRO +	Advanced Space Technologies to Support Security Operations
AVHRR	Advanced Very High Resolution Radiometer
BKA	German Federal Criminal Police Office
BOSS4GMES	Building Operational Sustainable Services for GMES
BSUAV	Border Surveillance by Unmanned Aerial Vehicles
CFSP	Common Foreign and Security Policy
CMMI	Capability Maturity Model Integration
CNI	Spanish Intelligence Agency
CNIT	Italian Interuniversity Consortium for Telecommunications
CO	Confidential
CONOPS	Concepts to Alternatives
COTS	Commercial Off-The-Shelf
CYCLOPS	Cyber Infrastructure for Civil Protection Operative Procedures
D	Demonstrator
DEFRA	Department of the Environment Food and Rural Affairs
DEM	Demonstration
DEM (2)	Digital Elevation Model
DG AGRI	Directorate-General Agriculture
DG ECHO	Directorate-General
DG ENTR	Directorate-General Enterprise and Industry
DG INFSO	Directorate-General Information Society & Media
DG REGIO	Directorate-General Regional Politics
DG TREN	Directorate-General Energy and Transport
DG-RELEX	Directorate-General
DMSP	Defence Meteorological Satellite Programme
DNA	Deoxyribonucleic acid
DORIS	Determination d'Orbite et Radiopositionnement Integres par Satellite
DRM	French Directorate of Military Intelligence
DSM	Digital Surface Model
DTM	Digital Terrain Model
EB	Executive Board
EGNOS	European Geostationary Navigation Overlay Service
EMSAT	European Mobile Satellite Phone
ENVISAT	European Environmental Satellite
ENVSEC	UN Environmental and Security Initiative
EO	Earth Observation
EO-DAP	Earth Observation Data Access Portfolio
EPS	EUMETSAT Polar System
ERS	European Remote sensing Satellite
ESA	European Space Agency
ESA GPOP	ESA Grid Processing on Demand
ESA-DAP	European Space Agency Data Access Programme
ESA-GSE program	European Space Agency GMES Service Element program

ESDP	European Security and Defence Policy
ESRAB	European Security Research Advisory Board
ESS	European Security Strategy
EU	European Union
EUMETSAT	European Organisation for the Exploitation of Meteorological Data
EUMS	European Union Military Staff
EURISK	European Union Assessment Procedure for Risk Management
EUSC	European Union Satellite Centre
FP	Framework Programme
FTS	Fast Track Services
GA	General Assembly
GAC	GMES Advisory Council
GAPACOM	Galileo Payload for Communication
GBIF	Global Biodiversity Information Facility
GBS	Gateway Business System
GDB	Geo Data Base
GEMS	Global and Regional Earth-system (Atmosphere) Monitoring using Satellite and in-situ data
GENACS	GMES European-wide Network Assistance and Coordination Support
Geo-CREW	Geo Crisis Early Warning Situation Awareness Architecture Concept
GEOINT	GEOspatial INTelligence
GEOLAND	Integrated GMES Project on Land Cover and Vegetation
GEOSS	Global Earth Observation System of Systems
G-FOUR	GMES-Forum Organization User Requirements
GIS	Geographical Information System
GMES	Global Monitoring for Environmental and Security
GMOSS	Global Monitoring for Security and Stability
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSE-GMFS	GMES Service Element
GSE-LAND	GMES Service Element for Land Information Services
GSI	Ground Segment Interface
GTC	Geocoded and Terrain Corrected
HALO	European Halo Project
HARMLESS	Project that uses EGNOS and Galileo for Emergency Management, Humanitarian Aid
HIC	Humanitarian Information Centres
IAEA	International Atomic Energy Agency
IASI	Italian Institute for Analysis of Informatical Systems
IDP	Internal Displaced People
INSPIRE	Infra Structure for Spatial InfoRmation in Erope
IP	Integrated Project
IPR	Intellectual Property Rights
ISO	International Organization for Standardization
ISS	Institute of Strategic Studies
ISSARS	Integrated Specialized Search and Rescue System
JHA	Third Pillar of EU. Justice and Home Affaires
JRC	Joint Research Centre
LADSAT	Satellite Data Analysis Laboratory
LIMES	Land-sea Integrated Monitoring for European Security
MAE	Italian Ministry of Foreign Affairs
MARCOAST	Marine and Coastal Environment Information Services

MARISS	European MARitime Security Service project
MEDSI	Distributed Information System To Improve Crisis Management
MERSEA	Marine Environment and Security for the European Area
METOP	Meteosat Operational
MGT	Management of the Consortium
MINDS	Multi-sensor image Interpretation and Dissemination System
MM	Man Month
MoDs	Ministries of Defence
MR	Medium Resolution
MS	Member States
MSc.	Masters' Course
MST	Management Support Team
NA	Not Applicable
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NcML	NetCDF Markup Language
NCW	Network Centric Warfare
NEEDS	New Energy Externalities Development for Sustainability
NetCDF	Network Common Data Form
NGO	Non-governmental organization
NIR	Near Infra-Red
NoE	Network of Excellence
NRT1	Near RealTime 1
NRT3	Near Real Time 2
O	Other
OCSE	Organisation for Economic Co-operation and Development
OGC	Open Geospatial Consortium
OLS	Operational Linescan System
OMC-G	Operational and Maintenance Centre- Gateway
OPeNDAP	Open-source Project for a Network Data Access Protocol
OSDI	Operating Systems Design and Implementation
OSIRIS	Open architecture for Smart and Interoperable networks in Risks management based on In-situ Sensors
PAC	Processing of Archiving Centre
Pan	Panchromatic
PASR	Preparatory Action in the Field of Security Research
PEARL	Partnership to Enhance Agriculture in Rwanda trough Linkages
PHARUS	Phased Array Universal SAR
PhD	Doctor of Philosophy
PM	Production Manager
PP	Restricted to other programme participants
PRESENSE	Pipeline Remote Sensing
PREVIEW	Operational
PU	Public
PUKIN	Austrian Ministry of Innovation and Technology
PWC	
QoS	Quality of Service
R&D	Research and Development
RATP	Paris Public Transportation Authority
RE	Restricted to a group specified by the consortium
RESPOND	Geographic Information Services for Humanitarian Aid
RISK-EOS	Earth Observation based Services for flood and fire risks management
ROI	Return Of Investment

RS	Remote Sensing
RST	Robust Satellite Techniques
RTD	Research and Technological Development
S & T	Science and Technology
SAB	Scientific Advisory Board
SAB	Scientific Advisory Board
SAFER	Services and Applications for Emergency Response
SAGE	Sharable Active Guideline for Environment
SAR	Synthetic Aperture Radar
SCEB	Executive Board - Steering Committee
SDIC	Spatial Data Interest Community
SeNTRE	Security Network for Technological research in Europe
SitCen	EU Joint Situation Centre
SLA	Service Level Agreement
SLC	Service Level Specification
SME	Small Medium Enterprise
SNCF	French National Railways
SOA	Service Oriented Architecture
SPOT	Satellite Probatoire d'Observation de la Terre
SRTM	Shuttle Radar Topography Mission
SWAT	Special Weapons And Tactics
TANGO	Telecommunications Advanced Networks for GMES Operations
TBD	To Be Defined
THREDDS	Thematic Realtime Environmental Distributed Data Services
TLC	Telecommunications
TM	Thematic Mapper
UAB	User Advisory Board
UN	United Nations
UN DPKO	United Nations Department of Peace-Keeping Operations
UN ODC	United Nations Office of Drugs and Crime
UNDP	UN Development Programme
USDA	US Defence Agency
VA	Value Adding
VHR	Very High Resolution
Vis	Visual Spectrum
VTS	Vessel Traffic System
W3C	World Wide Web Consortium
WBS	Work Breakdown Structure
WCS	Wireless Control System
WIN	Information Network for Risk Management Integrated Project
WPC	Work Packages Committees
WPD	Work Package Description
WPs	Work Packages

Annex C: GMOSAIC Building Block Characteristics

The following table summarizes the main characteristics of the Building Blocks used inside the GMOSAIC project providing the following data

- **BB ID.:** Building Block Identifier
- **Building Block Group.:** Building Block Group (PRE=Preprocessing, ADV= Advanced Processing, IMG= Image Interpretation,GIS= GIS Integration&Analysis, OTH=Other)
- **Product name:** Building Block name
- **WP Ref.:** Work package where Building Block can be used
- **Thematic Area:** thematic area where the building block can be used
- **ProductType:** type of product (R&D or Validated Product**)**
- **Expected availability:** (Already Available / Date of availability)
- **Input:** (Format, size, …)
- **Output:** (Format, size, …)
- **Type of processor:** (executable with/w.out runtime, need full licence)
- **Platform constraints:** (HW / OS / other)
- **Availabilty for GMOSAIC:** (only owner premises, available to project partners free of charge, IPR restrictions etc.)
- **Security reqs: security requirements:** (sensitive data) -Accessibility (restriction)
- **Dynamic behaviour - Performance parameters:** (e.g. processing time…)
- **Automation level:** Need an operator / fully automated
- **Resp. - IPR owner:** Responsible IPR-owner
- **Notes.** Comments or Notes

The final data sheets of the building blocks will integrate the list above with other data such: Information content, Scale/resolution and geographic coverage, Delivery time and update time, Delivery medium and format, Accuracy, Applicable user domain standards and formats and compliance status, Constraints on availability (e.g. geographic coverage, service provider infrastructure etc), Potential providers

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_1	PRE	**Orthorectified images**	Georeferencing	Validated Product (for optical data like SPOT-4, SPOT-5 and IRS-P6)	Spring 2009 (outside Europe)	Optical Satellite date (resolution > 10m and < 30 m) Level 1B	Level 1C (orthorectified)	executable	PC-Linux	owner premises, ftp-service	none	depending on sensor, image size	In most cases fully automatic	DLR
BB_2	PRE	**Image matching**	Image matching	Validated Product	Already available	Optical Satellite date Level 1	Co-registered image to reference image	executable	PC-Linux	owner premises	none	depending on sensor, image size	Need an operator	DLR
BB_3	PRE	**Orthorectified images**	Critical assets	Validated Product	Available	Native formats: IKONOS, QB, Spot	Level 1C (orthorectified)	executable	Windows	owner premises	none	depending on sensor, image size	Fully automatic	COTS + GMV addons
BB_4	PRE	**Satellite data preprocessing**	Crisis indicators-ENR Crisis indicators-PP Crisis indicators-LD	Validated Product	Already available	system-corrected satellite data	radiometrically corrected ortho-images	COTS image processing	no	available	no		operator	COTS
BB_5	ADV	**3D Change map**	Change Detection	R&D	Summer 2009	Co-registered Digital Surface Models, or two stereo pairs	3D change map (image)	executable	PC-Linux	owner premises	none	depending on sensor, image size	Need an operator	DLR
BB_6	ADV	**MAD-Change map**	Change Detection	R&D	Already available	Co-registered multispectral images	Change map (image)	executable	PC-Linux	available to project partners free of charge	none	depending on sensor, image size	Need an operator	none
BB_7	ADV	**Optical 2D change detection**	Critical assets	R&D	Avaliable early 2008	any standard image format	Standard output	COTS - Common-Off-The-Shelf Software		owner premises	none	dependent on image size	needs operator	EUROSENSE

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_8	ADV	**Change detection based on night-time images**	Critical assets	R&D	already available	Georeferenced images. Optical Satellite (OLS/DMSP, HSTC/SAC-C) data.	info on location and relative intensity of illuminance can be given in txt, KML, shape, vector, etc. formats	executable	PC-Winows	owner premises	none	depending on sensor, image size	semi-automated	CRPSM
BB_9	ADV	**Change detection based on low spatial resolution images.**	Critical assets	R&D	already available	Co-registered images. Optical Satellite (ASTER) data	info on location and relative intensity of changes can be given in txt, KML, shape, vector, etc. formats	executable	PC-Windows	owner premises	none	depending on sensor, image size	semi-automated	CRPSM
BB_10	ADV	**Optical-Sar VHR fusion**	Critical assets	R&D	Available Mid 2008	GeoTIFF, JPEG200, Native format	GeoTIFF	Executable	PC-Windows	owner premises	none	depending on sensor, image size	semi-automated	GMV
BB_11	ADV	**RST-based change detection**	Critical assets	R&D	already available	Co-registered images. Optical Satellite (EOS-NOAA-MSG) data: raw (antenna) format	info on location and relative intensity of anomalies can be given in txt, KML, shape, vector, etc. formats	executable	PC-Linux	owner premises	none	depending on sensor, image size	fully automated	UNIBAS
BB_12	ADV	**SAR Change Detection-Raster Output**	Critical assets	R&D	Available Mid 2008	GeoTIFF, JPEG200, Native format	GeoTIFF	executable	PC-Windows	owner premises	none	depending on sensor, image size	semi-automated	GMV

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_13	ADV	**SAR Change Detection-Vector Output**	Illegal activities Consequence management, reconstruction and resilience	R&D	already available	any image format	ESRI Shapefile	needs ERDAS Imagine licence	runs under ERDAS Imagine, Windows 2000 & XP	owner premises	none	dependent on image size	needs operator	TNO
BB_14	ADV	**Built-Up Area Estimation**	Crisis indicators-PP	R&D	Already available	radiometrically corrected ortho-images	built-up area raster file	executable without runtime	no	only owner premises	no		currently yes	M. Pesaresi, JRC
BB_15	ADV	**Built-Up Area Structural Characterisation**	Crisis indicators-PP	R&D	T0+9	radiometrically corrected ortho-images	GIS-ready built-up classes	executable without runtime	no	only owner premises	no		operator	JRC
BB_16	ADV	**Change detection**	Crisis indicators-ENR Crisis indicators-LD	Validated Product	Already available	radiometrically corrected ortho-images	GIS-ready change information	COTS image processing	no	available	no		operator	IST,Infoterra France,GISAT,PLUS-ZGIS

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_17	ADV	**Reference maps and assessment maps**	Routes and borders	R&D	2008/2009	Multi-source approach (TerraSAR-X data (Strip map, Spot light) + Optical data (VHR & HR))	Maps (scale: 1:10.000 - 1:100.000)	executable with runtime, fully operational system, full license is available	Hardware platform: SiliconGraphics - Fuel and Octan graphic workstations; Software Platform: IRIX Photogrametric software: LeicaPhotogrammetricSuite (ERDAS Imagine 9.1)	See Note 1)	Concerning TerraSAR-X the German satellite data security law has to be considered, if applicable	The staff of specialists will be ready 24/7. Orto-rectification process will be done couple of hours after VHR/SAR data acqusition. Data analysis time depends on amount of visable changes.	not fully automated, operator intervention needed	ITD/SCOR

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_18	ADV	**Processing chain for roads and border infrastructure detection**	Routes and borders	R&D	2009/2010	SAR data (Strip map, Spot light) + Optical data (VHR & HR)	tbd	tbd	tbd	owner premises	tbd	tbd	tbd	CRPSM
BB_19	ADV	**DEM**	Geo-spatial support for Crisis Management Operations	Validated Product	Already available	system-corrected satellite data	DEM (digital files)	Proprietary software	no	available	no		operator	Infoterra France
BB_20	ADV	**Reference maps**	Geo-spatial support for Crisis Management Operations	Validated Product	Already available	radiometrically corrected ortho-images	GIS-ready map including land use classes, point objects, networks	COTS image processing	no	available	no		operator	Infoterra France
BB_21	IMG	**Border Permeability maps**	Routes and borders	Further development & validation	2008/2009	SAR data (Strip map, Spot light) + Optical data (VHR & HR)	tbd	tbd	tbd	available	tbd	tbd	tbd	CRPSM
BB_22	IMG	**Asset mapping, reference mapping and monitoring of urbanized areas**	Routes and borders	R&D	2009	All types of available VHR optical and SAR imagery	Maps (scale: 1:5.000 - 1:20.000)	tbd	tbd	owner premises	Is dependent on data provider specifications.	tbd	Semi-automatic for some processes	EUROSENSE

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_23	IMG	**Traficability**	Routes and borders	R&D	2010	All types of available VHR optical and SAR imagery	Maps with relevant GIS layers (roads, settlements, flooded terrain)	COTS image processing + proprietary flood models	no	available	no	tbd	operator	SRC PAS / Infoterra France
BB_24	IMG	**Visual interpretation and semi-automated change detection**	Routes and borders	R&D	2008/2009	TerraSAR-X/Optical data, level 1A, HR/VHR	Reference and assessment maps in standard GIS formats	COTS image processing / GIS software	no	owner premises	Concerning TerraSAR-X the German satellite data security law has to be considered, if applicable	depending on sensor, image size	operator	ITD
BB_25	IMG	**Damage map**	Damage assessment	R&D	Summer 2009	Co-registered images	Damage map (image)	executable	PC-Linux	owner premises	none	depending on sensor, image size	Need an operator	DLR
BB_26	IMG	**DWEX-3D**	Damage assessment for post-conflict situations	R&D	Already available	radiometrically corrected ortho-images	GIS layer, reports, Google Earth files	COTS image processing, COTS GIS	PC-Windows 2000/XP	available	no	depending on sensor, image size	operator	PLUS

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_27	IMG	**Optical (V)HR 2D LU mapping and change detection**	Critical assets	R&D	Partly already availble/partly by summer 2009	any standard image format	Standard output	COTS - Common-Off-The-Shelf Software	no	owner premises	none	dependent on image size	needs operator	EUROSENSE
BB_28	IMG	**Landuse/-cover estimation**	Crisis indicators-ENR Crisis indicators-LD	Validated Product	Already available	radiometrically corrected ortho-images and/or land use classes	GIS-ready land use classes	COTS image processing	no	available	no		operator	IST,Infoterra France,GISAT,PLUS-ZGIS
BB_29	GIS	**Object-based change assessment**	Crisis indicators-ENR	R&D	Already available	GIS polygon layers, at least two time slots	GIS layer, reports	executable without runtime (COTS GIS)	PC-Windows 2000/XP	available	no		operator	PLUS
BB_30	GIS	**GIS integration of economic data**	Crisis indicators-ENR	Validated Product	Already available	economic data tables	GIS-ready data layers	COTS GIS	no	available	no		operator	COTS
BB_31	GIS	**GIS correlation od EO data**	Critical assets	R&D	End 2008	previously described GIS-layers	GIS layers, shape files	COTS GIS + GMV Adds on	Windows	owner premises	none		Manual intervention	COTS + GMV addons
BB_32	GIS	**GIS integration of economic data**	Critical assets	Validated Product	Already available	economic data tables	GIS layers, shape files	COTS GIS + GMV Adds on	Windows	owner premises	none		Manual intervention	COTS + GMV addons
BB_33	GIS	**GIS modeling for linking economic and EO data**	Crisis indicators-ENR	R&D	T0+9	previously described GIS-layers	GIS layer, reports	COTS GIS		available				Adelphi

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_34	GIS	**Object-based change assessment**	Damage assessment for post-conflict situations	R&D	Already available	GIS polygon layers, at least two time slots	GIS layer, reports	executable without runtime (COTS GIS)	PC-Windows 2000/XP	available	no		operator	PLUS
BB_35	GIS	**GIS based land-losses estimation**	Crisis indicators-LD	R&D	T0+9	land use and change information	GIS layer, reports	COTS GIS	no					COTS
BB_36	GIS	**Object-based change assessment**	Crisis indicators-LD	R&D	Already available	GIS polygon layers, at least two time slots	GIS layer, reports	executable without runtime (COTS GIS)	PC-Windows 2000/XP	available	no		operator	PLUS
BB_37	GIS	**Data integration & GIS modelling**	Geospatial support	R&D	Already available	single GIS layers, images	GIS analytical results	COTS GIS	PC-Windows 2000/XP	available	no		operator	PLUS
BB_38	GIS	**Integration into decision support system**	Routes and borders	R&D	2008/2009	Standard GIS formats	Web-based information and decision-support system	COTS image processing / GIS software	no	owner premises	Concerning TerraSAR-X the German satellite data security law has to be considered, if applicable	depending on sensor, image size	operator	ITD

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_39	OTH	**ELISEO**	Geo-spatial support for Crisis Management Operations	Validated Product	Already available	Raster (Images, maps) and vector geo-information	Visualisation, editing facilities	Proprietary software ELISEO		available	no		operator	Infoterra France
BB_40	OTH	**Issuing situation reports**	Routes and borders	R&D	2008/2009	Reference and assessment maps	Situation reports and/or maps	COTS image processing / GIS software	no	owner premises	Concerning TerraSAR-X the German satellite data security law has to be considered, if applicable	depending on sensor, image size	operator	ITD

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_41	IMG	**Maps of critical infrastructure**	Critical assets	R&D	2008/2009	TerraSAR-X/Optical data, level 1A, HR/VHR	Reference and assessment maps in standard GIS formats	COTS image processing / GIS software	no	owner premises	Concerning TerraSAR-X the German satellite data security law has to be considered, if applicable	depending on sensor, image size	operator	ITD
BB_42	IMG	**3D object reconstruction from VHR SAR**		R&D	2008/2009	Very high resolution SAR data (TerraSAR-X, CosmoSkyMed), reference information	DEMs/DSMs in raster format	Executable	Windows/Linux	available to project partners but requires extensive user training		depending on image size	Need trained	JR
BB_43	IMG	**2D/3D change detection with optical/SAR VHR images**		R&D	2008/2009	(1a) Set of rectified input images (at least for two epochs) and original meta information or (1b) Original satellite data (2) DSMs (at least for one epoch)	Maps of changes in raster format	Executable	Windows/Linux	available to project partners but requires extensive user training		depending on image size	Need trained	JR

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_44	PRE	**Orthorectified images production _TCF**		Validated Civilian Product : for optical data like SPOT-4, SPOT-5 , IRS-P6, IKONOS, Quickbird, WV1, EROS B for SAR imagery : ERS, Radarsat, Cosmo-SkyMed, TerraSAR-X. Validated Defense Product (under agreement with the countries) SAR-LUPE, Cosmo-SkyMed. Future products (2010) Pléiades satellites imagery Airborne and UAV imagery also supported	Already available	Optical and SAR Satellite data : Format native product issued from the receiving ground terminal or GeoTiff, NITF 2.1, NSIF optical resolution > 0,5 m and < 30 m SAR resolution >1 m and < 30 m Image size up to 16 Gbytes	orthorectified product GeoTIFF, NITF 2.1, NSIF (STANAG 4545)	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor	depending on sensor, support data like DTM quality or level, image size	In most cases fully automatic	THALES and French gouv.

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_45	ADV	**Multi sensor images matching_ TCF**		Validated Civilian Product : for optical data like SPOT-4, SPOT-5 , IRS-P6, IKONOS, Quickbird, WV1, EROS B for SAR imagery : ERS, Radarsat, Cosmo-SkyMed, TerraSAR-X. Validated Defense Product (under agreemment with the countries) SAR-LUPE, Cosmo-SkyMed. Future products (2010) Pléiades satellites imagery Airborne and UAV imagery also supported	Already available	Optical and SAR Satellite data : Format native product issued from the receiving ground terminal or GeoTiff, NITF 2.1, NSIF optical resolution > 0,5 m and < 30 m SAR resolution >1 m and < 30 m Image size up to 16 Gbytes	relative modeling function or grid that permit to co-register image to reference imagery.	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Automatic when images to be matched are delivered with Auxiliary Data that authorize the system to compute a physical model of sensor otherwise need an operator	THALES and French gouv.

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_46	ADV	**3D Change map_TCF**		Validated	Already available	Co-registered Digital Surface Models, or two stereo pairs or interferometric cuples	3D change map (image)	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor			THALES and French gouv.
BB_47	ADV	**MAD-Change map_TCF**		Validated	Already available	Optical and SAR Satellite data : Format native product issued from the receiving ground terminal or GeoTiff, NITF 2.1, NSIF optical resolution > 0,5 m and < 30 m SAR resolution >1 m and < 30 m Image size up to 16 Gbytes	Image of result may contain in one color the object that disappears and in a other color object that appears	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Automatic when images to be matched are delivered with Auxiliary Data that authorize the system to compute a physical model of sensor and the images are co-registered otherwise need an operator and we suppose teh images have been co-registered previously	THALES and French gouv.

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_48	IMG	**Damage map_TCF**		Validated	Already available	Optical and SAR Satellite data : Format native product issued from the receiving ground terminal or GeoTiff, NITF 2.1, NSIF optical resolution > 0,5 m and < 30 m SAR resolution >1 m and < 30 m Image size up to 16 Gbytes	Image of result may contain in color the damage area	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Automatic when images to be matched are delivered with Auxiliary Data that authorize the system to compute a physical model of sensor and the images are co-registered otherwise need an operator and we suppose teh images have been co-registered previously	THALES and French gouv.

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_49	ADV	**SAR change detection_ TCF**		Validated	Available 1st quarter 2009	SAR Satellite data : Format native product issued from the receiving ground terminal or GeoTiff, NITF 2.1, NSIF SAR resolution >1 m and < 30 m Image size up to 16 Gbytes	Vector data which may be exported as shapefile	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Needs an operator	THALES and French gouv.
BB_50	PRE	**Satellite data preprocess ing_TCF**		Validated	Already available	Optical and SAR Satellite data : Format native product issued from the receiving ground terminal or GeoTiff, NITF 2.1, NSIF optical resolution > 0,5 m and < 30 m SAR resolution >1 m and < 30 m Image size up to 16 Gbytes	Orthorectified product radiometrically corrected GeoTIFF, NITF 2.1, NSIF (STANAG 4545)	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Automatic depending of sensor otherwise needs an operator	THALES and French gouv.

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_51	IMG	**Landuse/-cover estimation _TCF**		Validated	Available end 2008	Optical and SAR Satellite data : Format native product issued from the receiving ground terminal or GeoTiff, NITF 2.1, NSIF optical resolution > 0,5 m and < 30 m SAR resolution >1 m and < 30 m Image size up to 16 Gbytes	GIS-ready land use classes (VMAP classes or other)	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Needs an operator	THALES and French gouv.
BB_52	ADV	**Change detection_ TCF**		Validated	Available end 2008	Optical and SAR Satellite data : Format native product issued from the receiving ground terminal or GeoTiff, NITF 2.1, NSIF optical resolution > 0,5 m and < 30 m SAR resolution >1 m and < 30 m Image size up to 16 Gbytes	GIS-ready land use classes (VMAP classes or other)	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Needs an operator	THALES and French gouv.
BB_53	GIS	**GIS integration of economic data_TCF**		Validated	Already available	Economic and political data features	GIS classes may be defined dynamically	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Needs an operator	THALES and French gouv.

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_54	GIS	**GIS modeling for linking economic and EO data_TCF**		Validated	Already available	Existing classes, certain may be specialized	GIS classes may be linked to external object like reports or EO	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Needs an operator	THALES and French gouv.
BB_55	PRE	**Satellite data preprocessing_TCF**		Validated	Already available	Optical and SAR Satellite data : Format native product issued from the receiving ground terminal or GeoTiff, NITF 2.1, NSIF optical resolution > 0,5 m and < 30 m SAR resolution >1 m and < 30 m Image size up to 16 Gbytes	Orthorectified product radiometrically corrected GeoTIFF, NITF 2.1, NSIF (STANAG 4545)	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Automatic depending of sensor otherwise needs an operator	THALES and French gouv.
BB_56	IMG	**Built-Up Area Structural Characterisation_TCF**		Validated	Already available	Optical and SAR Satellite data : Format native product issued from the receiving ground terminal or GeoTiff, NITF 2.1, NSIF optical resolution > 0,5 m and < 30 m SAR resolution >1 m and < 30 m Image size up to 16 Gbytes	GIS-ready land use classes (VMAP 2i classes or other)	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Needs an operator	THALES and French gouv.

BB ID.	BB Group	Product name	Thematic Area	Product Type	Expected availability	Input	Output	Type of processor	Platform constraints	Availabilty for GMOSAIC	Security requirem.	Dynamic behavior - Performance parameters	Need an operator / fully automated	Resp.: IPR owner
BB_57	OTH	**GIS based land-losses estimation _TCF**		Validated	Already available	Optical and SAR Satellite data : Format native product issued from the receiving ground terminal or GeoTiff, NITF 2.1, NSIF optical resolution > 0,5 m and < 30 m SAR resolution >1 m and < 30 m Image size up to 16 Gbytes	GIS-ready land use classes (VMAP classes or other)	System	PC-Linux 64 bits	In test in EUSC (Torrejon) in the frame of the TIES demonstrator	depending on sensor		Needs an operator	THALES and French gouv.

Table 0-1: Building Block characteristics

NOTE 1)

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