4 MONITORING OF NUCLEAR SITES AND ACTIVITIES

Satellite imagery is an important open source for verifying compliance with nuclear regulations and non-proliferation treaties. Together with other, equally important information, including collateral information obtained from open sources, declarations provided by member states and, last but not least, data acquired during on-site inspections or visits, it can provide the basis for integrated information systems aimed at monitoring nuclear sites and activities. This scenario provides tools in support of users from nuclear verification authorities. Two sub-scenarios have been identified: **Monitoring of nuclear decommissioning** according to nuclear decommissioning regulations and **Monitoring of nuclear activities in the context of the Nuclear Non-Proliferation Treaty (NPT).**

5 ILLICIT CROPS

The objective of this scenario is to collect information related to illicit crops by using new sensor data and specific algorithms to improve traditional methodologies used to determine the surface areas of land occupied by illicit crops. This objective is achieved by increasing the accuracy, improving the efficiency and lowering the cost of the methods currently used. In addition the aim of the scenario is to develop an illicit crops warning service, in order to allow monitoring of specific areas for establishing the extent of illicit crop activities or monitoring of land use change. Other important goal is to establish historical trends in areas of traditional agricultural production (new plantation of illicit crops, development of new infrastructure, etc.) and to detect signs of the presence of illegal crop cultivations in new regions or countries.
Two sub-scenarios have been identified: **Situation awareness of illicit crops cultivation areas** and **Illicit crops warning service**.

6 BORDER SURVEILLANCE

The main objective of the scenario is to develop standard products to support the European External Action Service (EEAS) based on the methodology of Intelligence Preparation of the Environment - IPE - to monitor border conflicts and borders of interest in the EU's neighbouring countries (in accordance with the European Neighbourhood Policy's mandate) and in areas where the security of EU citizens is affected.
The key element of this scenario is to determine the Geospatial Preparation of the Environment related to border permeability.
One sub-scenario has been identified: **Border Monitoring.**

PROGRESS BEYOND THE STATE-OF-THE-ART

Building on the lessons learned, G-SEXTANT specifically addresses services for Security applications that are not yet 'mature' and therefore need further research and analysis in order to become operational. The project develops both technological tools and thematic studies in the scenarios of interest, whilst building on the results already achieved by other projects. All results will be subject to user feedback to enhance the final products.
In brief, in the selected scenarios G-SEXTANT will enhance the processing chains, the integration and demonstration. In parallel with G-SEXTANT, another FP7 project, G-NEXT (Pre-operational Security services in support of External Action) will facilitate the transition of Copernicus services in Support of EU External Action from pre-operational to operational status.
European citizens and the European Union as a whole will benefit from the enhancement of services supporting intelligence and early warning as well as crisis management operations.

The G-SEXTANT project started on January 1st, 2013 and is scheduled to last twenty four months.

PROJECT PARTNERS

Coordinator

The research leading to these results has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement nº 312703.

GEOSPATIAL INTELLIGENCE IN SUPPORT OF EU EXTERNAL ACTION

SERVICES FOR SECURITY APPLICATIONS COPERNICUS

COPERNICUS AT A GLANCE

Copernicus, previously known as GMES (Global Monitoring for Environment and Security) is the European Earth Observation (EO) programme which combines the use of satellite images and data with local, *in situ*, data sources to deliver geospatial information services and products to a wide range of end-users. It aims to achieve an autonomous and operational European capability in environmental and Security information services. The programme is developed and funded by the European Commission, while the development of the observation infrastructure is performed under the aegis of the European Space Agency (ESA) for the Space component and of the European Environment Agency (EEA) and Member States for the *in situ* component. The information gathered and relayed by Copernicus helps to improve the management of natural resources, monitor the quality of water supplies, monitor and forecast air pollution, support urban planning and prevent urban sprawl, ease the flow of transportation, optimise agricultural activities and promote the development of renewable energy sources. Furthermore, Copernicus will improve the safety of nations and citizens in numerous ways, for example by providing early warning of natural disasters (such as floods and fires) and supporting the management of humanitarian or regional crises, forest fires and floods, thereby helping to prevent loss of life and property damage. It will also provide a basis for enhanced modelling and forecasting activities to help to improve our understanding of the drivers of climate change and to mitigate its consequences. Copernicus does not replace existing European capacities, but rather complements them with a view to fulfilling user needs and guaranteeing sustainability and European autonomy in the long term. The Copernicus programme is currently reaching the end of its phase of Initial Operations (2011-2013). Land Monitoring and Emergency Management services became operational during this period. The remaining pre-operational and research-oriented services are expected to transition to operations from 2014 onwards.

THE G-SEXTANT PROJECT

Geospatial intelligence in support of EU External Action

G-SEXTANT aims to develop a portfolio of Earth Observation (EO) products and services to support the geospatial information needs of EU External Action users and stakeholders, such as the European External Action Service (EEAS). Building on the lessons learned in previous projects, G-SEXTANT enhances existing services on the basis of detailed analysis of users' needs through continued R&D. G-SEXTANT is focused on the technologically non-mature services developed within the G-MOSAIC precursor project.

The main goals of the G-SEXTANT project are:
a) The preparation and delivery of pre-operational services, developed in the context of user-driven Support to External Action (SEA) scenarios;
b) The enhancement of mature products and services, as requested by users;
c) The development of a standardised portfolio of products and services.

G-SEXTANT addresses the following proposed scenarios in the context of support to EU External Action:

> Humanitarian Crisis;
> Natural Resources Exploitation;
> Land Conflict Situation Awareness;
> Monitoring of Nuclear Sites and Activities;
> Illicit Crops;
> Border Surveillance.

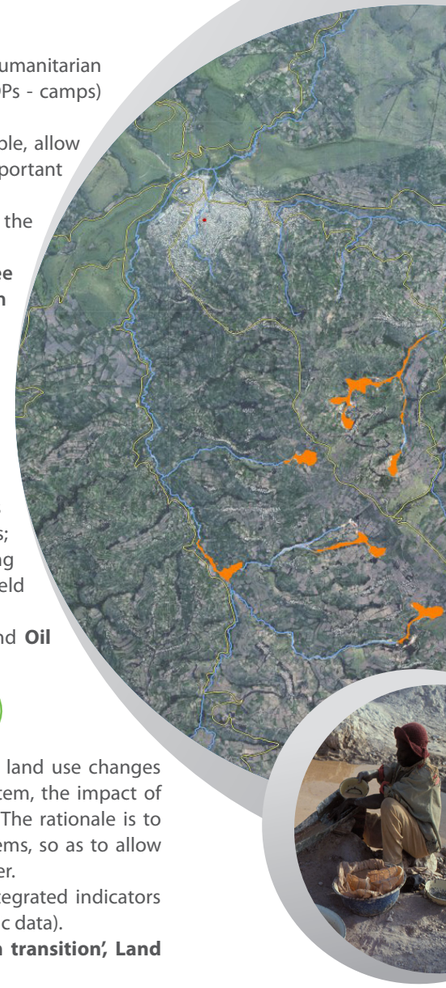
The G-SEXTANT project takes into account the skills and experience of the various stakeholders involved: industry (in terms of production and implementation capacity), academic and research organisations (in terms of scientific expertise), and EU bodies and institutions (in terms of coherence with existing policies and operations, and access to intelligence data). Finally, the feedback of the users will be taken into consideration during the production and design phase in order to enhance the final products, so that the impact of the project on the Security user community can be analysed.

G-SEXTANT SCENARIOS

The G-SEXTANT scenarios are based on the integration of satellite-based Earth Observation (EO) data with *in situ* data, open source intelligence and HUMINT (Human Intelligence), where available. Building on the experience of precursor projects (GMOSS, LIMES, G-MOSAIC, SAFER), the scenarios are often divided into sub-scenarios to illustrate how the data can be used.

1 HUMANITARIAN CRISIS

The overall objective of this scenario is the provision of information products related to humanitarian crisis through the analysis of temporary (e.g. refugee/Internally Displaced Persons - IDPs - camps) and informal settlements (e.g. slums) in fast-growing cities.
> **TEMPORARY SETTLEMENT:** Satellite based information products, which, for example, allow to estimate the number of dwellings (as a proxy for the camp population), provide important information to support humanitarian aid and conflict prevention.
> **INFORMAL SETTLEMENT:** EO products allow the monitoring of urban growth and the identification of potential hot spots that decrease urban resilience.
Four sub-scenarios have been identified: **Situation analysis, Monitoring of refugee camps during a crisis, Support the repatriation processes after a crisis, Identification and monitoring of informal settlements**.



NATURAL RESOURCES EXPLOITATION 2

Natural resources are often exploited beyond a sustainable level, spoiling natural habitats, affecting people's livelihoods and potentially fuelling armed conflict. Vast areas of land must be observed within a narrow time frame, since exploitation activities can easily move from one area to another. These areas are generally difficult to access because they are widely dispersed, too remote or too dangerous for field missions; conflict situations often prevent research teams from travelling freely. Remote sensing is therefore complementary to more traditional means of monitoring, and can often yield valuable information on the presence and dynamics of exploitation activities.
Two sub-scenarios have been identified within this service: **Mining of Minerals** and **Oil Exploitation**.

LAND CONFLICT SITUATION AWARENESS 3

The overall aim of this scenario is to provide conditioned geospatial information on land use changes in relation to conflict-prone situations like the transition of a political or societal system, the impact of refugee/Internally Displaced Persons - IDPs - camps or large-scale land investments. The rationale is to effectively link empirically observable changes in the natural habitat and social systems, so as to allow predictions about changes occurring in one of them based on developments in the other.
Such interdependencies will be captured and showcased by the development of integrated indicators based on EO data, in-situ data, expert-knowledge and ancillary data (e.g. socio-economic data).
This scenario is divided into three sub-scenarios: **Land use changes in 'systems in transition', Land degradation, Land use changes caused by large-scale land investments.**