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INTEGRATED IMAGE INTELLIGENCE SYSTEM (I3S)

The I3S concept (Integrated Image Intelligence System) represents an important step for autonomy in the IMINT (IMage INTelligence) field (obtaining information by aerospace imagery photointerpretation and analyses). An independent country should have the control of its own IMINT information source to manage and monitor the national and boundary territory.
This paper aims to present the I3S operational missions, the structure of a military intelligence center (MIC) and the I3S facilities for training and services.

INTRODUCTION

The IMINT (IMage INTelligence) field means to obtain information using the photointerpretation and analysis of aerospace and terrestrial imagery.
The Integrated Image Intelligence System, named I3S according to the NATO standard, represents a major step to get autonomy and sovereignty in image information and intelligence. It is also a dedicated solution for military and civilian applications and represents an affordable solution for further evolutions.
To be more efficient, the architecture of this concept it's build around three main subsystems (figure 1):

- aerospace vectors and ground reception stations for digital images processing and archiving;
- processing and analysis systems developed inside the exploitation centers;
- proficient image analysts for image photointerpretation.

I3S OPERATIONAL MISSIONS

A feasible I3S system it's designed to carry out the following missions:

- political sovereignty: a sovereign state must control its own source of image information to master and monitor the situation inside and around its frontiers;
- military superiority: I3S provides high quality image intelligence for military decision making and mission planning through cartography, activity identification, tactical analysis, Digital Terrain Model, etc.;
- civilian missions: I3S provides an extensive source of data for any decision making process in Earth environment monitoring.

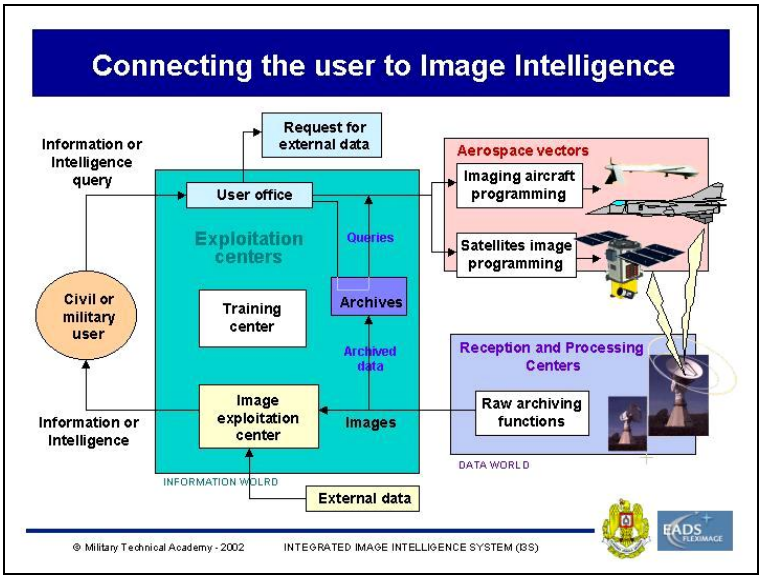

Figure 1: The I3S configuration

The table 1 presents a typical scenario solved by I3S methodology and finalized by an intelligence report:

Typical scenario for I3S military application Table 1.

Authority →	Defense Ministry / Rapid Action Force
Purpose →	Helicopter mission preparation on fresh data
Needs →	Limited area: 10×10 km^2 Mission rehearsal
Delay →	24 hours

To accomplish these needs we have to fulfill the following steps:

- mobile station deployment;
- satellite mission programming (sensor selection, reservation request, meteorological forecast,…);
- reception of technical data;
- image processing (geometric/radiometric, scenes geocoding, 3D data generation for flight simulation);
- image analysis (localization of known elements, change detection, search for new installations, activity detection);
- data transfer to the Mission Preparation Facility;
- action.

OPERATIONAL PERFORMANCES

From operational point of view, figure 2 presents the data stream processed in I3S architecture (Raducanu, 2001):

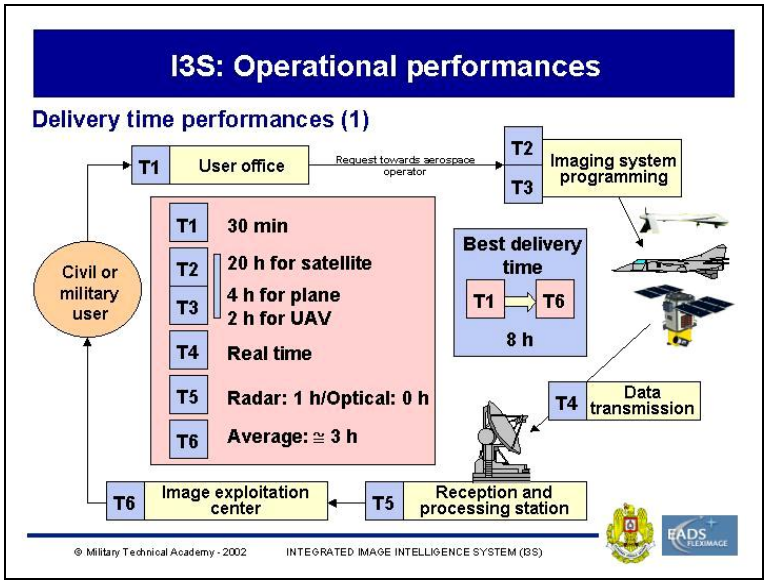

Figure 2: The data stream dynamics in I3S facility

Assuming that I3S is programmed to receive imagery from SPOT, RADARSAT, ERS, IKONOS and EROS satellite missions, the total capacity may reach 250 images/day. Two reception limitations have to be taken into account: the satellite availability (programming conflict in the area) and meteorological conditions (the total view time in the area of interest should be studied).

THE MILITARY INTELLIGENCE CENTER

The I3S concept becomes a reliable activity only integrated in a Military Intelligence Center (MIC) structure. MIC represents the solution for national defense and security applications.

Thus, in peacetime MIC will monitor the border zone situation and perform surveillance of potential crisis spots. In crisis anticipation time MIC will accomplish close surveillance of areas of interest and gather technical

information. Finally, in crisis time MIC will perform mission planning, search and rescue activities and battle damage assessment (Blondelle, 2001).
Connected to a reception station, MIC offers a wide variety of technical functions, enabled by a dedicated software/hardware configuration (figure 3):

- extraction of IMINT from source data through image analysis process;
- cartographic products elaboration (2D, 3D);
- building of intelligence reports;
- training;
- storage and retrieval of intelligence data in high performance geographical databases.

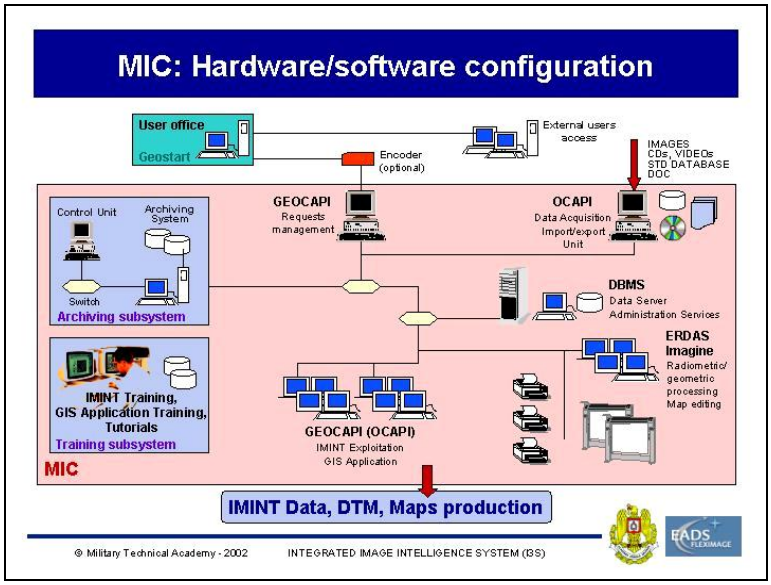

Figure 3: The typical MIC software/hardware configuration

CONCLUSIONS

The satellite it's the only reconnaissance tool, which has the capability to supply, in a discrete way, detailed images of a certain area from the Earth surface. At the beginning of the space era, the satellite was considered an inadmissible spying instrument, but very quickly was demonstrated its legality in information acquisition activity for peace and global security promotion.
The I3S concept offers new opportunities in this field, together with the classical information sources. Besides the very high panchromatic and multispectral resolution, which close the satellite imagery to the aerial one, we ad all thematic

processing resources supplied by I3S. These inner advantages are completed by the system operation mode, which enable a rapid access to a certain zone and information updating by multitemporal analyses performed by photointerpretation experts.

REFERENCES

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