IT for space Systems
A project oriented view of IT in space projects

Andrea Bennetti – Client Relationship Manager
Tel +31629350733
andrea.bennetti@sapienzaconsulting.com

April 28th 2010
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Who is Sapienza & what we do

1. IT challenges in space projects (where is the potential for software applications development and services in a typical space project organization)
2. Sapienza past experience in supporting space projects (experiences from supporting ESA missions, the project teams and industrial partners)
3. Sapienza approach to supporting future space projects and the growing space industry sector in Europe - (The ECLIPSE product suite rationale, an overview)
4. Were does IT fit in after a space Project enters the Operational phase? (exploiting and distributing data - examples and experiences from Sapienza Geoportal and Disaster Management Charter websites projects)
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Who we are

- UK SME specialised in supplying software solutions and IT services in the areas of project management and Product Assurance for the institutional and commercial space Sector.
- Working for ESA programmes since 1998
- Our software applications have supported various phases of more than 20 ESA missions including: Mars Express, Rosetta, Herschel, Planck, Exomars, Columbus, ATV, Galileo, Earth Explorer missions, ENVISAT, GOCE, SMOS and many more.
- Offices in UK, The Netherlands, Italy
What We Do

PM and QA Software & Applications
- Space-Standards based, ESA proven project and Quality Management Software Products & Bespoke software

Geo-Spatial Portal Solutions
- Portal Design & E2E
- Satellite imaging data-access and distribution with secure or public access
- Geospatial web portals for Earth monitoring and disaster management

Consultancy
- Technical Feasibility Studies
- E2E IT solutions scoping, design and implementation
- Secure Networks design, implementation, testing and maintenance

Manpower
For administrative and technical disciplines personnel:
- IT all
- Quality Assurance
- Product Assurance
- Administrative
- Consultants
- Project controllers
- Project managers
- Web content managers
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A simple (eye-test) view of the European space Institutional Market

(National or EC level) Agencies

(EU, ESA, SSTL, Gavazzi)

Typical Space System Product Tree

Quite a complex environment for information flow...
The typical ESA space Mission

From ECSS standard for project management
Managing information, knowledge and processes in the space project 1/2

Managing Ideas, Documents, Reviews, Actions, NCRs, …. Formal and informal
Managing information, knowledge and processes in the Space Project 2/2

- Controlling information in a Space Project means, controlling:
  - Security
  - Timing
  - Interfacing
  - IP issues
  - Longevity (many years of mission)
  - Enabling collaboration (reducing duration and cost)

Increased interest towards concurrent design enabling IT systems and infrastructures
The regulatory aspects

- **ECSS European Cooperation for space Standardization**
- Software development in the space sector should follow ECSS Standards
- The software engineering Standard concerns the product software, i.e. software that is part of a space system product tree and developed as part of a space project.
- This Standard is applicable, to the extent defined by the tailoring process, to all the elements of a space system, including the space segment, the launch service segment and the ground segment.

**Regulatory aspects can be a chore, or an opportunity…the important is be aware of them…**

- with management and product assurance, which are addressed in the management (-M) and Product assurance (-Q) branches of the ECSS System, and explains how they apply in the software engineering processes.
- This Standard reflects the specific methods used in space system developments, and the requirements for the software engineering processes in this context. Together with the requirements found in the other branches of the ECSS Standards, this Standard provides a coherent and complete framework for software engineering in a space project.
- This Standard is intended to help the customers to formulate their requirements and suppliers to prepare their responses and to implement the work
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Sapienza Historical approach in supporting ESA Missions and projects with software applications

- DMS (Document Management System)
- space process-based Sapienza applications
  - RID (reviews management application)
  - MAIS (meetings and actions management)
  - NCTS (non-conformances management)
  - RISK (risk management)
  - WLMS (work load management)
  - ECP, RFA, VCS, EFI C4I, CMS, SODB, ESTER, APRIL, ...
- Portals
Customer Base

Registered Users via ESA projects

10000+ registered users (100+ companies) for our applications via ESA
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New paradigm for Sapienza software for the space Industry

GOAL-1 Provide a Platform that addresses the whole European space Sector (in our leadership niche)

GAOL-2 Lowering overall cost of applications, ownership, operation, support

- Leveraging the regulatory aspects of ECSS, with further ECSS alignment
- Complementing the product suite in support of a larger number of space project management, Quality Assurance and Product Assurance processes
- Harmonizing and integrating our software applications
- Improving applications User’s experience (modern UI, web 2.0 etc.)
- Modularizing process based applications (single modules deployable in an industry platform)
- Reduce dependency from Proprietary software
ECLIPSE is a Framework which provides space project Teams (at all levels on the supply chain) a one point access to all the project enabled applications:

- Allows collaboration across the market segmentation, Institution with primes, primes with Systems suppliers and so on all the way down the supply chain.
- Managing core PA and QA process in an electronic format for the duration of a space project (Mission), spanning a decade or more..
- Powerful searches capabilities for any stored information.
- Manage and retain risk information in space projects.
- Manage and retain Actions and associated information in space projects and tracking evolutions.
- Managing space project Reviews, tracking evolution.
- A mixed of critical applications and attractive features to enhance users participation and experience.
Building a modular platform to support the space project

ECLIPSE is a software framework which provides space project teams a one point access to all the project enabled applications and reduces the...
ECSS Compliant toolset for Information and projects
Support of Enterprises in space

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Information and Data Access Portals

- Designed for collecting, managing and publishing information, services and data products relating to the monitoring of the environment, natural resources, climate change and security issues
- Design to meet the needs from both the data providers and data users of earth observation
- Improve data dissemination to end-users
- Community collaboration features
- Use of standard protocols improving interoperability for information exchange, harvesting and management
- OGC compliant Data catalogue integration for storing map products and other satellite images
- Portrayal Viewer Service allowing the display and handling of maps/images and contextual information
- Geospatial RSS feeds capabilities
- Platform Scalable to integrate other web services
Example 1 the GEOportal: www.geoportal.org

Objectives:
- Provide access to remote sensing, geospatial-static and in-situ data, information and services

Users:
- Policy makers and managers
- Scientific researchers and engineers
- Civil society
- Governmental organizations and NGOs
- International bodies assisting with the implementation of multilateral environmental agreements

Services:
- Geospatial Portal Service providing the user interfaces for viewing, discovering data, information and services available in GEOSS
- Portrayal Viewer Service allowing the display and handling of maps and context information from various sources through WMS services
- Interfaces to Catalogue Services of the GEOSS Clearinghouse, allowing distributed catalogue search in an interoperable manner.
- A comprehensive directory of service providers e.g. related to GEO Members and Participating Organizations.
- Retrieval of Earth observation education, training and capacity building resources
Objectives:
- To provide a unified system of space data acquisition and delivery to those affected by natural or man-made disasters through Authorized Users.
- To mitigate the effects of disasters on human life and property.

Users:
- Authorized Users

Services:
- An Authorized User can call a single number to request the mobilization of the space and associated ground resources (RADARSAT, ERS, ENVISAT, SPOT, IRS, SAC-C, NOAA satellites, LANDSAT, ALOS, DMC satellites and others) of the member agencies to obtain data and information on a disaster occurrence.
- A 24-hour on-duty operator receives the call, checks the identity and info
- The operator passes the information to an Emergency On-Call Officer who analyzes the request and the scope of the disaster with the Authorized User, and prepares an archive and acquisition plan using available space resources.
- Data acquisition and delivery takes place on an emergency basis

Example 2 DM Charter: http://www.disasterscharter.org
Conclusions
The widespread needs for IT Systems in space can be summarized by the following:

- Automation of core and common space industry processes
- Space project supply chain integration
- Improve collaboration in the space project

- Knowledge Management
- Information security and retention

- Information and data exploitation
- Standardization of data formats
- Information and data fusion (for added value)
Thanks to:

& Thanks to You
Andrea Bennetti
Client Relationship Manager
Tel +31629350733
andrea.bennetti@sappienzaconsulting.com