SSA DC-IV NEO
Fireball Information System

ESRIN, 02/02/2016

Ole Kverneland

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ToC - Agenda

- Introduction
- Project review
- Technical review
- Lessons learned & way forward
- Questions/AOB

Introduction

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Context

- SSA : Space Situational Awareness

- Predict and assess the risk
  - due to man-made space debris objects,
  - potential impacts of Near-Earth Objects (NEOs),
  - and the effects of space weather phenomena on space- and ground-based infrastructure.

- ESA SSA program composed of three segments
  - SWE : Space Weather
  - NEO : Near-Earth Objects
  - SST : Space Surveillance and Tracking

Context

- DC-IV WP-NEO: Fireball, Impacts and Atmospheric Explosions Database
- Fireball :
  - A bright meteor with an apparent visual magnitude of -4 mag. or brighter.

Objectives

- **Develop a fireball database to be included in the NEO Web portal**
- **This database should contain fireballs with a magnitude larger than -10**
- **Observations starting from 01/01/2010**

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Project review

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DC-IV consortium

- DC-IV overall consortium

- WP-NEO organisation

Capgemini at a glance

Ever since it was founded 48 years ago, Capgemini has been at the forefront of helping companies to transform themselves, by combining innovation and competitiveness. Today we compete in the Champions League of global players. How did we get there? Thanks to several unique capabilities that make all the difference:

Almost 180,000 team members[1] in more than 40 countries

Revenues[2]
€10.573 billion
Net result[2]
€580 million
Net cash[3]
€1.218 billion
Free organic cash flow[2]
€668 million

7 strategic alliances
EMC², HP, IBM, Microsoft, Oracle, Salesforce.com, SAP

A wide range of cutting-edge expertise for all our clients
Consulting ❶ / Local Professional Services ❷ / Application Services ❸ / Other Managed Services ❹

7 values shared since the company's creation in 1967
honesty / boldness / trust / freedom / team spirit / modesty / fun

Expertise in **six strategic sectors**
Consumer products & retail, distribution & transportation / Energy, utilities & chemicals / Financial services (Insurance and banking) / Manufacturing / Public sector / Telecom, media & entertainment

A unique way of working
The Collaborative Business Experience™ ❺ and Rightshore® ❻

A promise that expresses our brand philosophy
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Capgemini Mission Critical Systems – Space Unit

250+ dedicated engineers on Space & ATM programs

30+ experience-years in Space domain
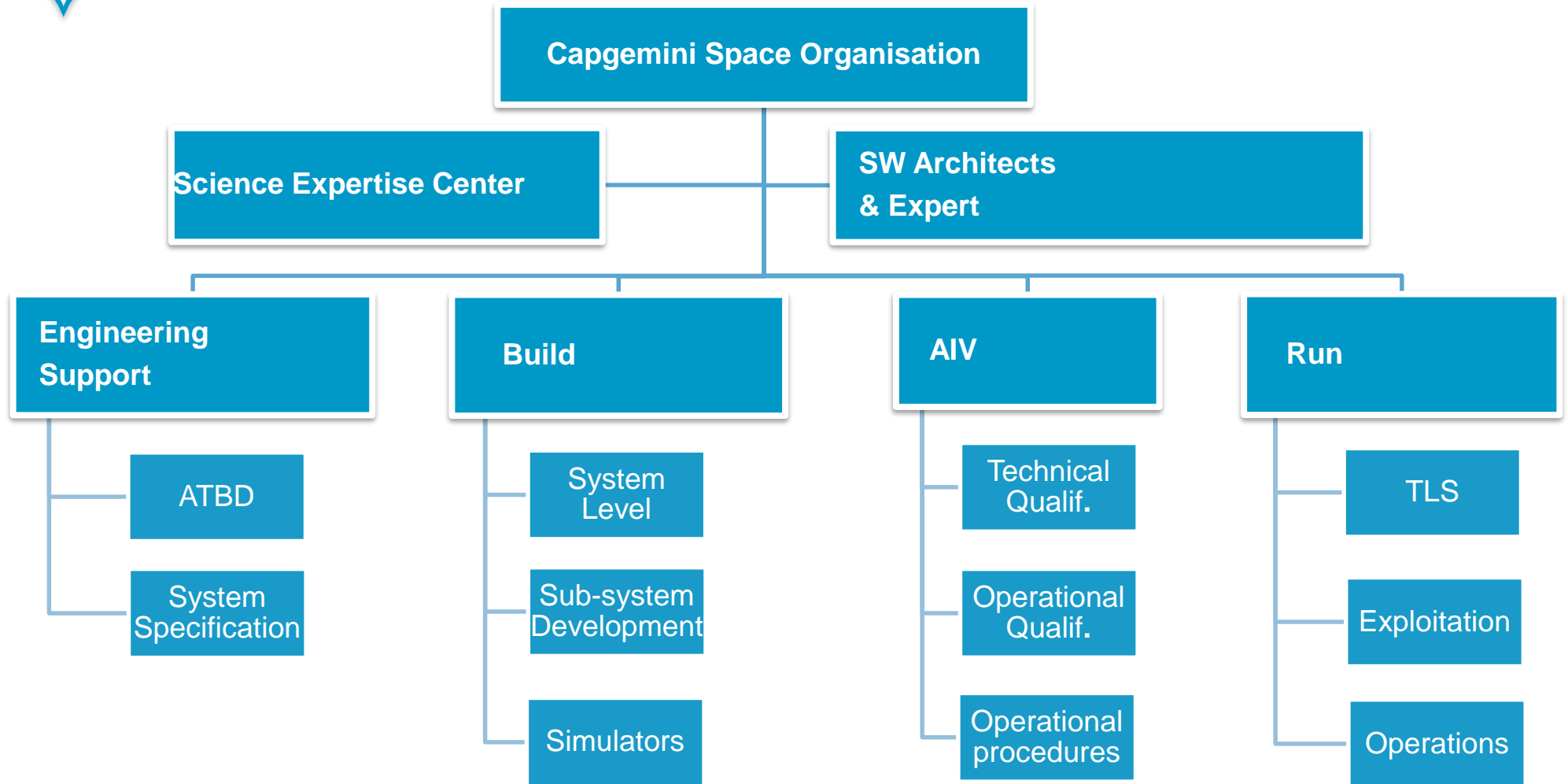
Prime locations: Toulouse, Bayonne

Innovative solutions

Science expertise center

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Capgemini Mission Critical System- Space Unit

Capgemini Space Organisation

Science Expertise Center

SW Architects & Expert

Engineering Support
- ATBD
- System Specification

Build
- System Level
- Sub-system Development
- Simulators

AIV
- Technical Qualif.
- Operational Qualif.
- Operational procedures

Run
- TLS
- Exploitation
- Operations

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DC-IV consortium

- GMV overall management of the DC-IV activity
- Capgemini lead of the WP-NEO
  - All development phases

- Support from GMV in NEO work domain related activities
  - Mainly requirements engineering and design phases

Tools & methods

- Use of ESA Software development environment :
  - DOORS for requirements
  - HP Quality Center for test management
  - Sharepoint for information exchange
  - Rational Change
- Capgemini Continuous Integration Platform
  - Maven, SVN, checkstyle, PMD, JUNIT, Hudson, Sonar, Findbugs …
- ECSS standards for traceability
- SCRUM/Agile for flexibility

Schedule

Milestone	KO Schedule	Final date	Delay (months)
Kick off meeting	12/11/2012	12/11/2012	0
Software requirements review	15/01/2013	23/07/2013	6
Preliminary Design Review	15/03/2013	22/10/2013	7
Cricital Design Review	Not planned	25/02/2013	----
FAT Test readiness review	27/10/2013	01/04/2014	6
Acceptance review 1	31/10/2013	05/09/2014	11
OSAT Test Readiness Review	07/01/2014	01/10/2014	9
Acceptance review 2	13/01/2014	31/10/2014	9

- In the end 9 months delay with initial schedule.

Schedule

- SWRR : 6 months delay due to contractual issues. All DC-IV activities were put on hold between January 2013 and Mai 2013.

- CDR : not part of initial planning and requirements

- FAT : delayed in order to FAT testing of the Fireball database in the latest version of the NEO portal (Single Sign-On functionality).

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Technical review

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Questions

- Which are the pieces of data available for a fireball ?
- How to collect the data ?
- How do we organize the data ?
- Where to the data come from ?

- => Not that simple …

- Iterative and pragmatic approach, discussion between Capgemini, GMV and ESA

Data model

- Difficulty : define the data model, link the different data to the « objects »
- Identify optional and mandatory data
- Who may access data ? Some should not be available on the web to all visitors
- **The data model was modified during all project phases**
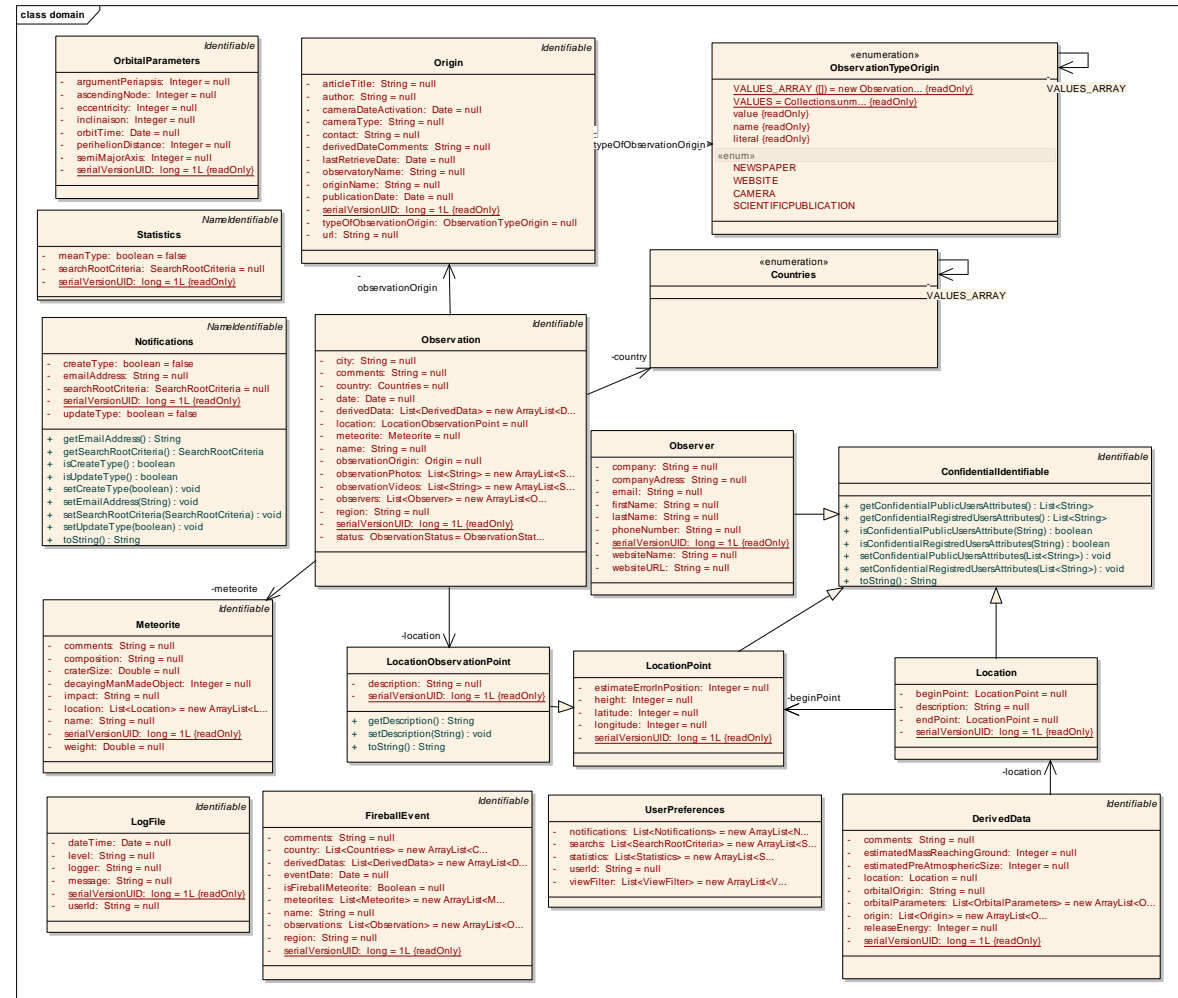
Who and how ?
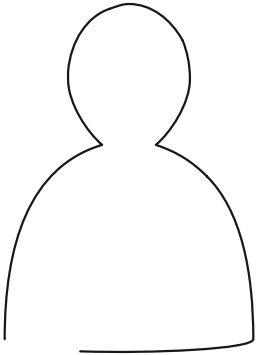
Operator : managing the database (NEO front desk operator)
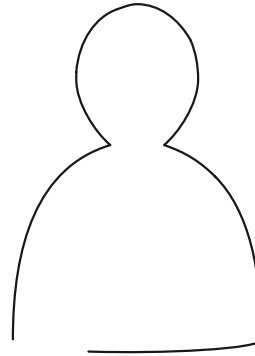
Registered user : may save search, statistics, acces restriced information
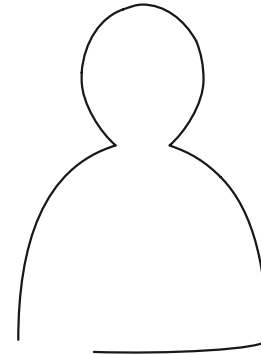
Public users : you and me on the surfing on the web

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Database structure

- Fireball event : describing what is considered as a fireball event;
- Observation; a reported observation of a fireball event.
- And derived data: data that are linked to the fireball that have been computed or derived.
- Meteorite: object found on ground linked to the fireball

METEORITE — (0,N) — (1,N) → OBSERVATION

(0,N) (1,N) (1,N)

(0,1) (0,1)

FIREBALL EVENT — (1,N) — (0,N) → DERIVED DATA

(0,N)
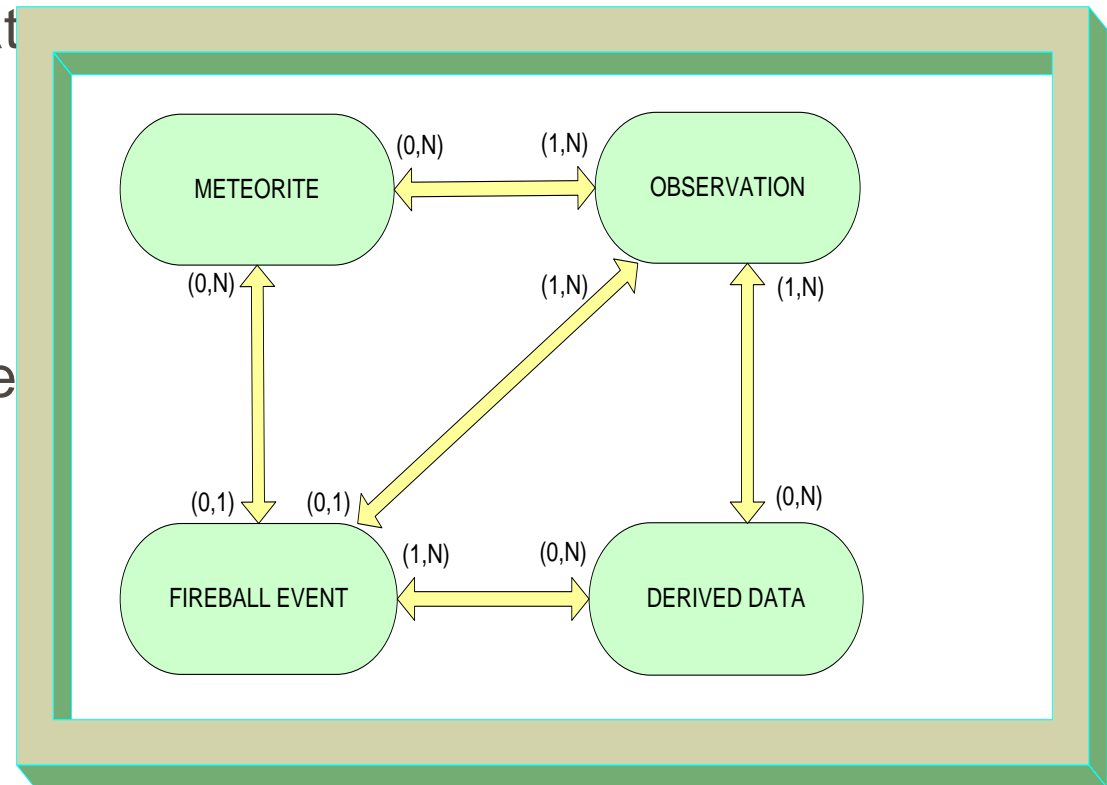
Dynamical view

- The 'entry' data come from the 'Observations' which are the main group of data
The other groups of data (fireball event and derived data) are created depending on the observation(s)

- A fireball event can be created if there is 1 created observation ;
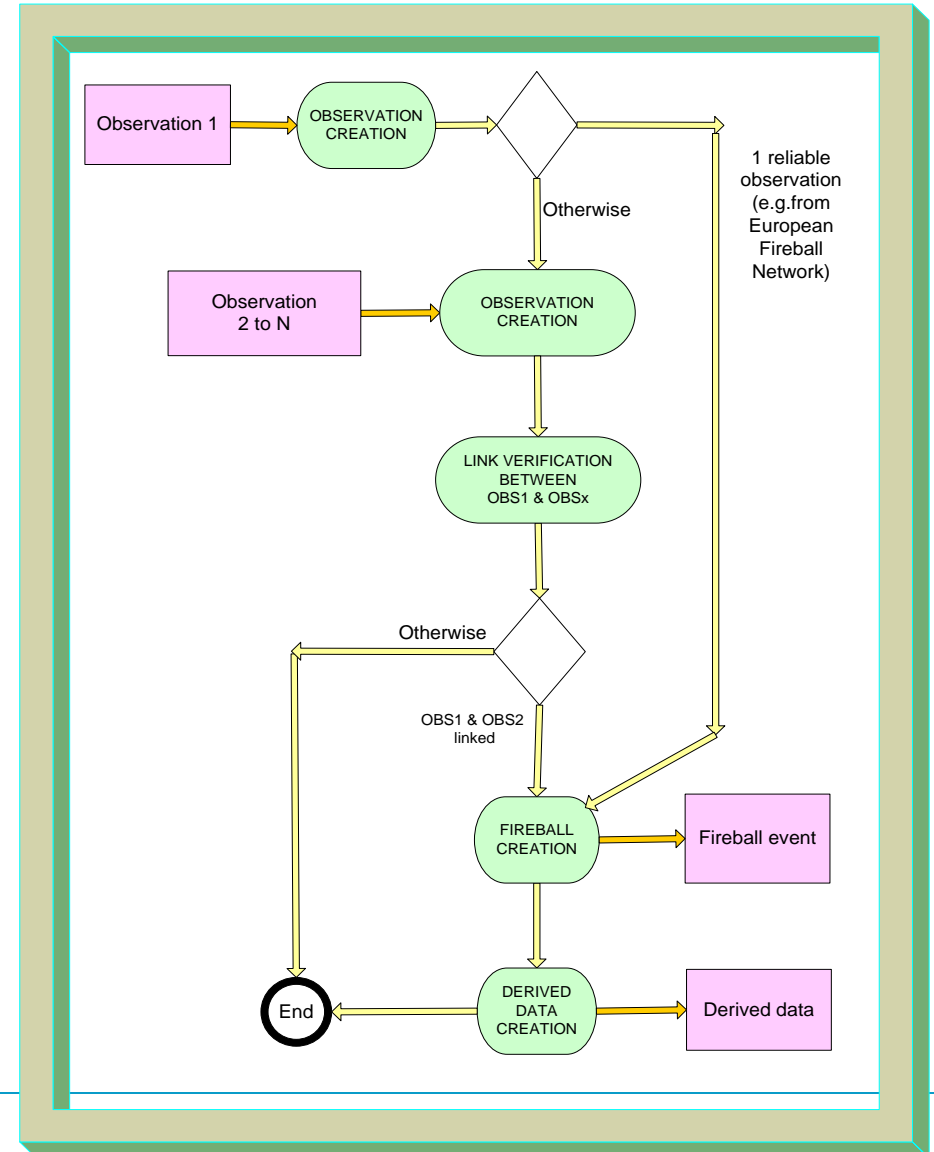
Techincal view

- Portlets integrated in Liferay portal
- Business services deployed in a glassfish application server
- Database on a mysql data server
- Search engine Lucene-Solr
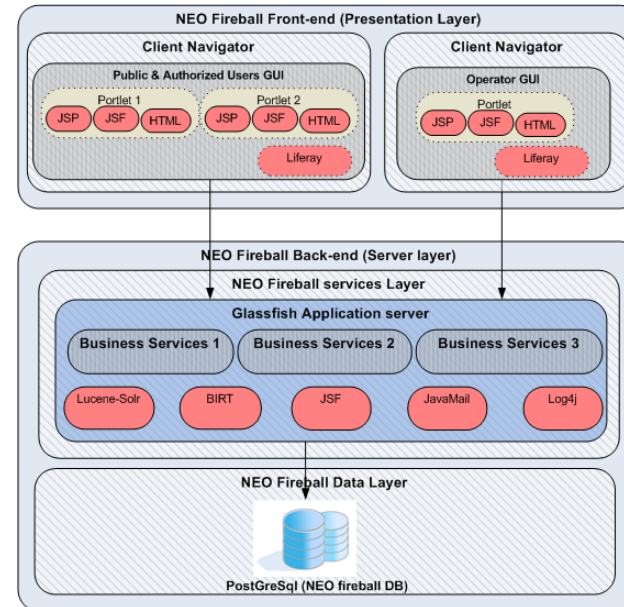
Physical View

- All machines are virtual
- Load balancing is optional
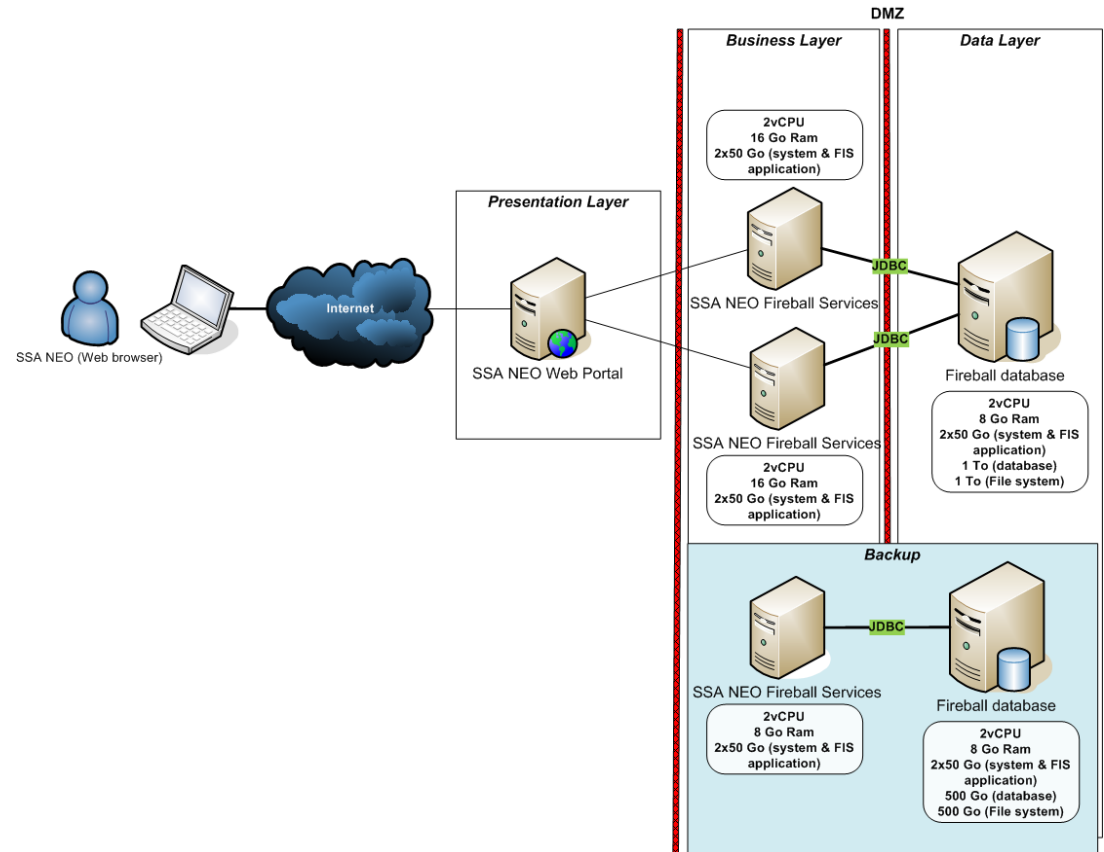
Authentication

- Use of SSA Single Sign-On
- Restful interface
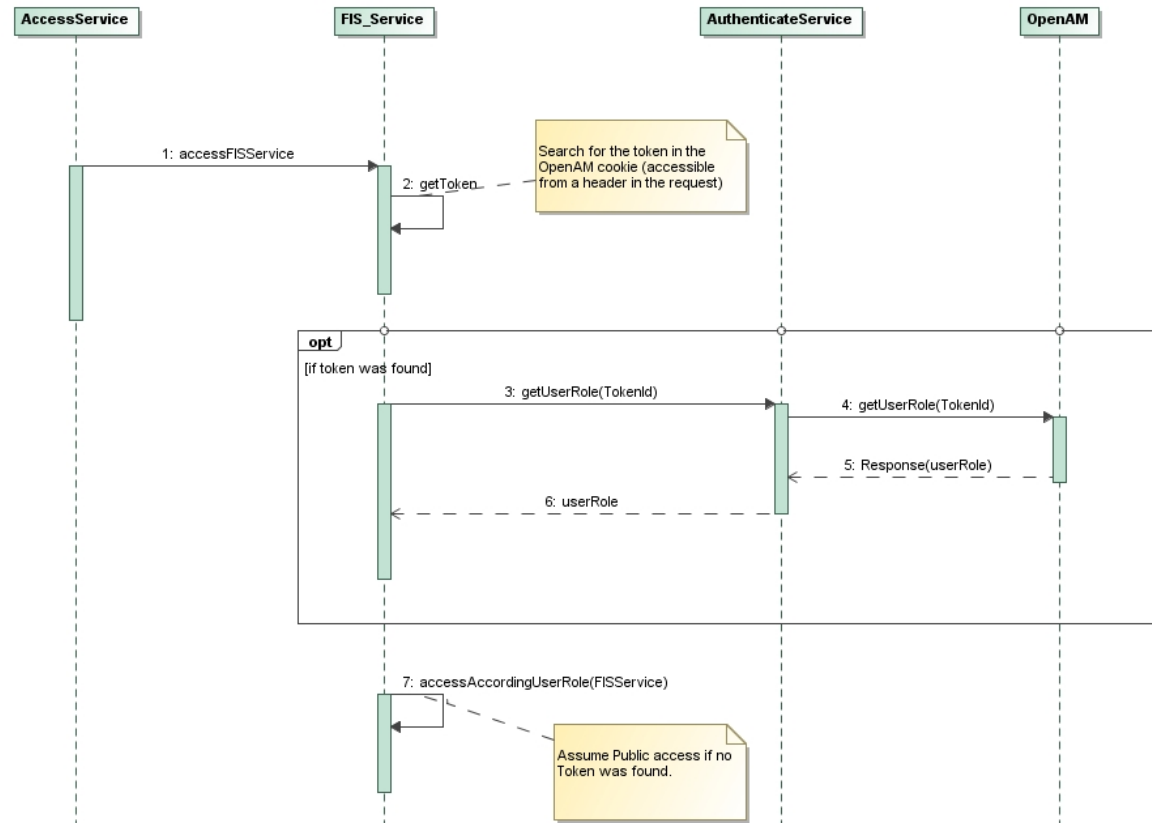
Let's take a look
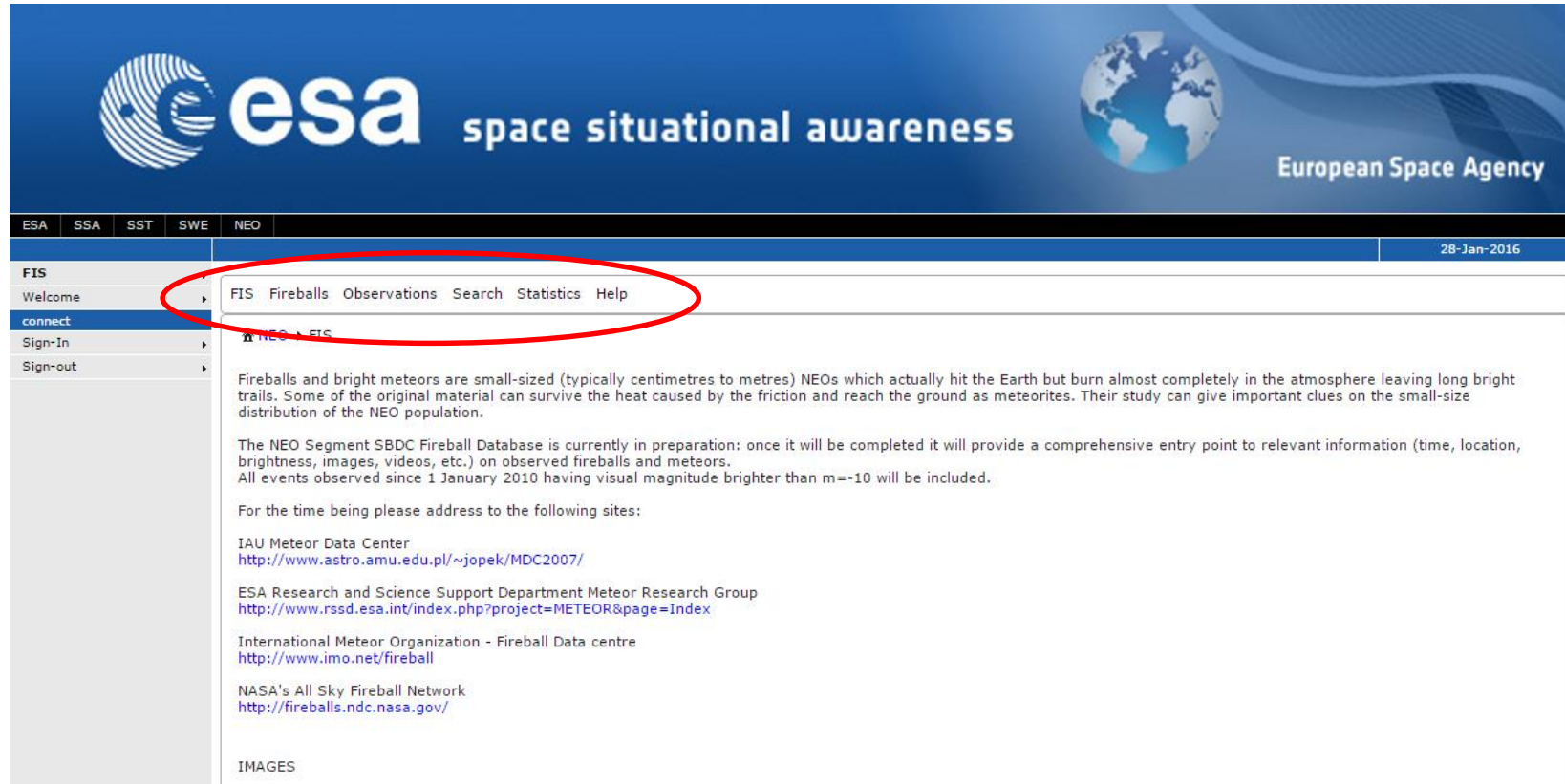
- Menu for public users

Acessing data

- Fireball example
- Navigation through breadcrumb

Search function

- Free search :

Search

- Advanced search

Operator view

- Menu for operator
- Edit tool for the welcome page

Operator

- **Select observation tab**

- **Add new**

- **Operator my edit and remove observations**

Operator

- Mandatory fields marked with (*)

- Select different tabs and enter data

Managing data

- Add derived data

Managing data

- Add derived data

Log view

FIS   Fireballs   Observations   Search   Notifications   Statistics   Import/Export   Logs   Help

⌂ NEO ▸ FIS ▸ Logs

⚙ User Id ⇕	Level ⇕	Logger ⇕	Date Time ▾	Message ⇕	Actions
Joffrey	INFO	esa.ssa.neo.fis.portlet.bean.user.UserPreferencesBackingCo ntrollerBean	01/28/2016 16:44:40	Joffrey : Save data table settings with id:aceLogs	remove
	WARN	esa.ssa.neo.fis.common.rest.FisRestTemplate	01/28/2016 16:44:40	POST request for "http://vm-ssa-liferay.ssa.esa:8081/openam_953/identity/attributes" resulted in 401 (Non-Autorisé); invoking error handler	remove
Joffrey	ERROR	FIS-Portlet	01/28/2016 16:44:40	Joffrey : Error retrieving user properties. Session expired, please log in again.	remove
	WARN	esa.ssa.neo.fis.common.rest.FisRestTemplate	01/28/2016 16:44:40	POST request for "http://vm-ssa-liferay.ssa.esa:8081/openam_953/identity/attributes" resulted in 401 (Non-Autorisé); invoking error handler	remove
Joffrey	ERROR	FIS-Portlet	01/28/2016 16:44:40	Joffrey : Error retrieving user properties. Session expired, please log in again.	remove
Joffrey	INFO	FIS-Portlet	01/28/2016 16:44:40	Joffrey : Your request processed successfully	remove
	WARN	esa.ssa.neo.fis.common.rest.FisRestTemplate	01/28/2016 16:44:40	POST request for "http://vm-ssa-liferay.ssa.esa:8081/openam_953/identity/attributes" resulted in 401 (Non-Autorisé); invoking error handler	remove
Joffrey	ERROR	FIS-Portlet	01/28/2016 16:44:40	Joffrey : Error retrieving user properties. Session expired, please log in again.	remove
	WARN	esa.ssa.neo.fis.common.rest.FisRestTemplate	01/28/2016 16:43:31	POST request for "http://vm-ssa-liferay.ssa.esa:8081/openam_953/identity/attributes" resulted in 401 (Non-Autorisé); invoking error handler	remove
Joffrey	ERROR	FIS-Portlet	01/28/2016 16:43:31	Joffrey : Error retrieving user properties. Session expired, please log in again.	remove

|◀ ◀◀ **1** 2 3 4 5 6 7 8 9 10 ▶▶ ▶| 10 ▼

Remove all

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Lessons learned &
way forward

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General requirements

- Many general requirements applicable to all the WP
- Relevant to M&C system, less relevant to a web interface
  - Logs, …

- FIS SRS written by Capgemini engineering team experienced on a system level

- =>Adjust the priority given to general requirements with low added-value to users

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Integration & CFI

- The NEO web portal was not provided as a CFI
- Requirement to have look & feel compliant with the existing portal
- Discussion and iterations on the HMI on
  - Colors
  - Screen width
  - Button size and forms…
- Technical solution for authentication not clear
- Request : existing neo portal using the Liferay users management
- Other request : Single Sign-On using the SSA OpenAM server.

- => Having the NEO portal at the beginning of the project would have saved time.

Waterfall vs Agile

- Contractual baseline : waterfall with reviews
- Development method : Scrum Agile

- True Agile not compliant with the availability of ESA interfaces (TO and NEO domain experts)

- However: flexibility on both sides to adjust and change requirements during entire project (staying at iso-complexity)

- => Agile inside waterfall contract works well if both parties are constructive, mutual thrust needed
  - Capgemini experience also from other clients

Future

- Ergonomic improvements based on user feedback …
- Import function may be improved (create events, but operator appreciation needed somewhere in the process)
- Import data from other sources than the American Meteor Society
- System integration :
  - Import automatically observations from other websites
  - Create observations from reports from observers ?
  - Interface for (Public, Registered) users to submit online new observations ?

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Questions / AOB

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Contact information

Insert contact picture

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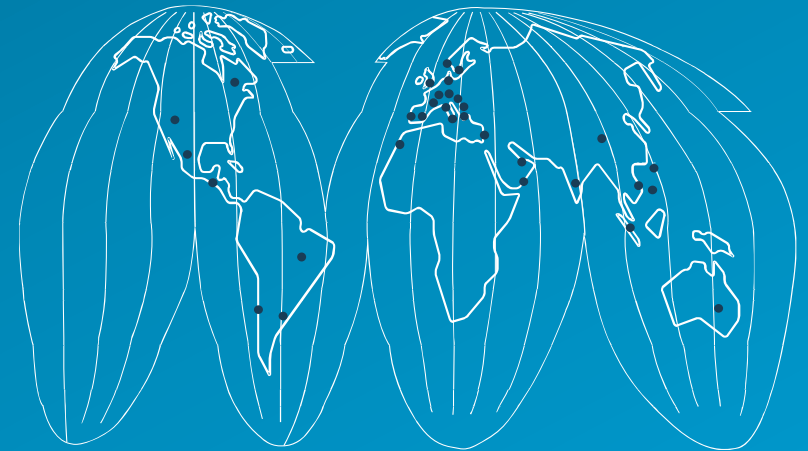ole.kverneland@capgemini.com

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