A federated European Cloud Marketplace for Science leading to Information as a Service

Cloud School, IN2P3, 4 July 2014

Maryline Lengert, ESA

# A European cloud computing partnership: big science teams up with big business

HELIX NEBULA — THESCIENCECLOUD

Strategic Plan

▶ Establish multi-tenant, multi-provider cloud infrastructure

▶ Identify and adopt policies for trust, security and privacy

▶ Create governance structure

▶ Define funding schemes

CERN
To support the computing capacity needs for the ATLAS experiment
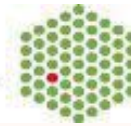
EMBL
Setting up a new service to simplify analysis of large genomes, for a deeper insight into evolution and biodiversity

esa
To create an Earth Observation platform, focusing on earthquake and volcano research

PIC port d'informació científica
To improve the speed and quality of research for finding surrogate biomarkers based on brain images

Suppliers

Atos CGI CloudSigma CSA cloud security alliance DANTE www.dante.net EGI indra interoute MEMSET HOSTING

SAP sixsq SWITCH ··T··Systems terradue 2.0 the SERVER LABS ultimum technologies Yandex

Adopters

AWST Capgemini cnrs ECMWF Ifremer orange Business Services Telefónica THALES Trust-it Communicating ICT to Markets www.trust-itservices.com
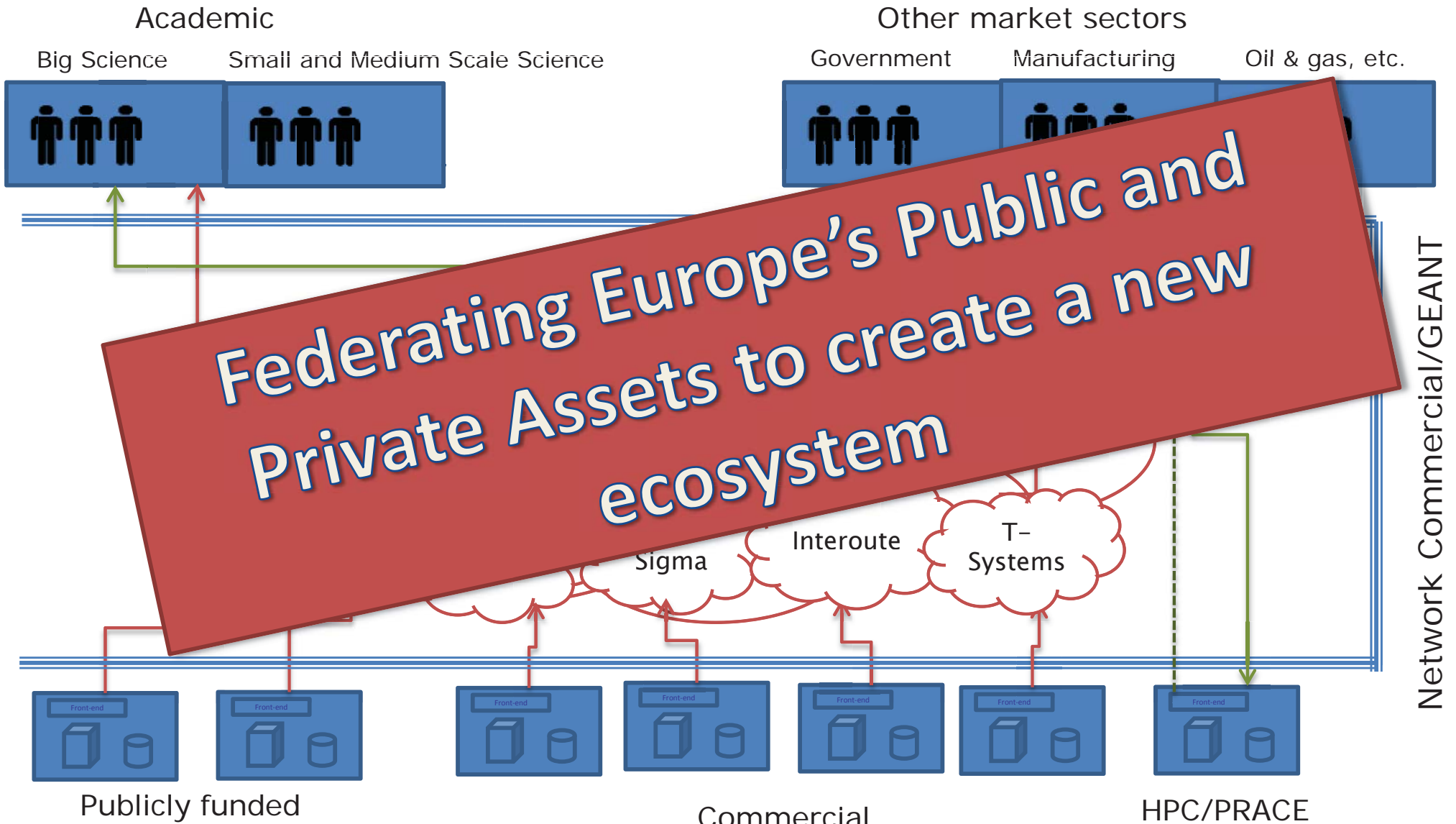
Building on existing European e-Infrastructures

- Existing European e-infrastructure *long-term* **projects**
  - GEANT, EGI, PRACE, EUDAT

- Many "pathfinder" initiatives have prototyped aspects of what will be needed in the future
  - Includes much of the work in the existing e-Infrastructure projects
  - Thematic projects / infrastructures such as BioMedBridges/ CRISP/ DASISH/ ENVRI, EMSO as well as CORIOLIS / GEOWOW / DORIS and many others

- Future service infrastructure and tools must be fully based on **open standards**, **open software**, and enable **open data access**

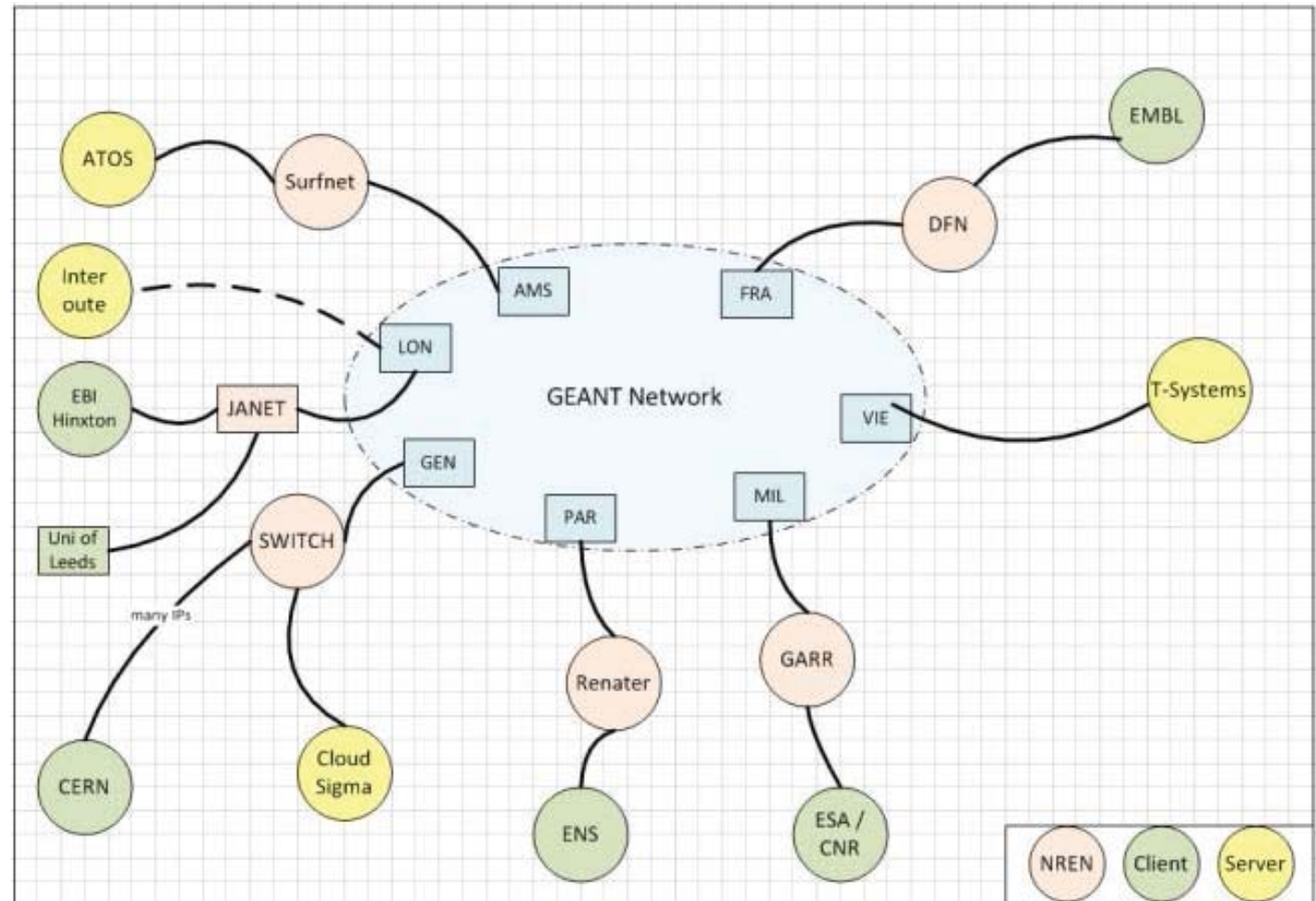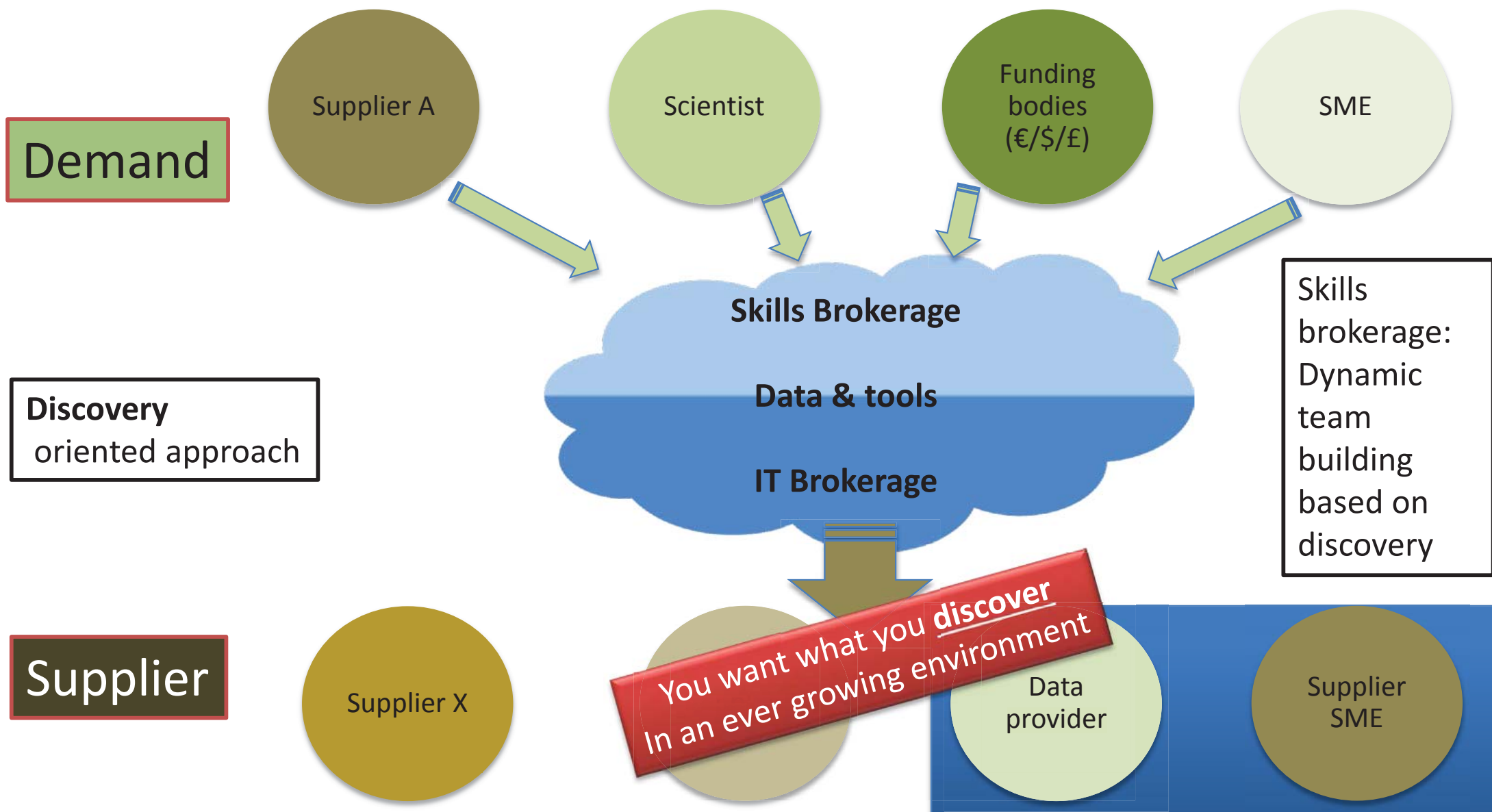# Hybrid Public-Private Cloud Model
Federation of partners

HELIX NEBULA
THE SCIENCE CLOUD

Academic

Other market sectors

Big Science   Small and Medium Scale Science

Government   Manufacturing   Oil & gas, etc.

Federating Europe's Public and Private Assets to create a new ecosystem

Network Commercial/GEANT

Sigma   Interoute   T–Systems

Front-end   Front-end   Front-end   Front-end   Front-end   Front-end   Front-end

Publicly funded

Commercial

HPC/PRACE

Building the hybrid cloud
Connecting commercial providers to the GÉANT/NRENs

DANTE offering free IP connectivity in GÉANT for research traffic during the pilot phase

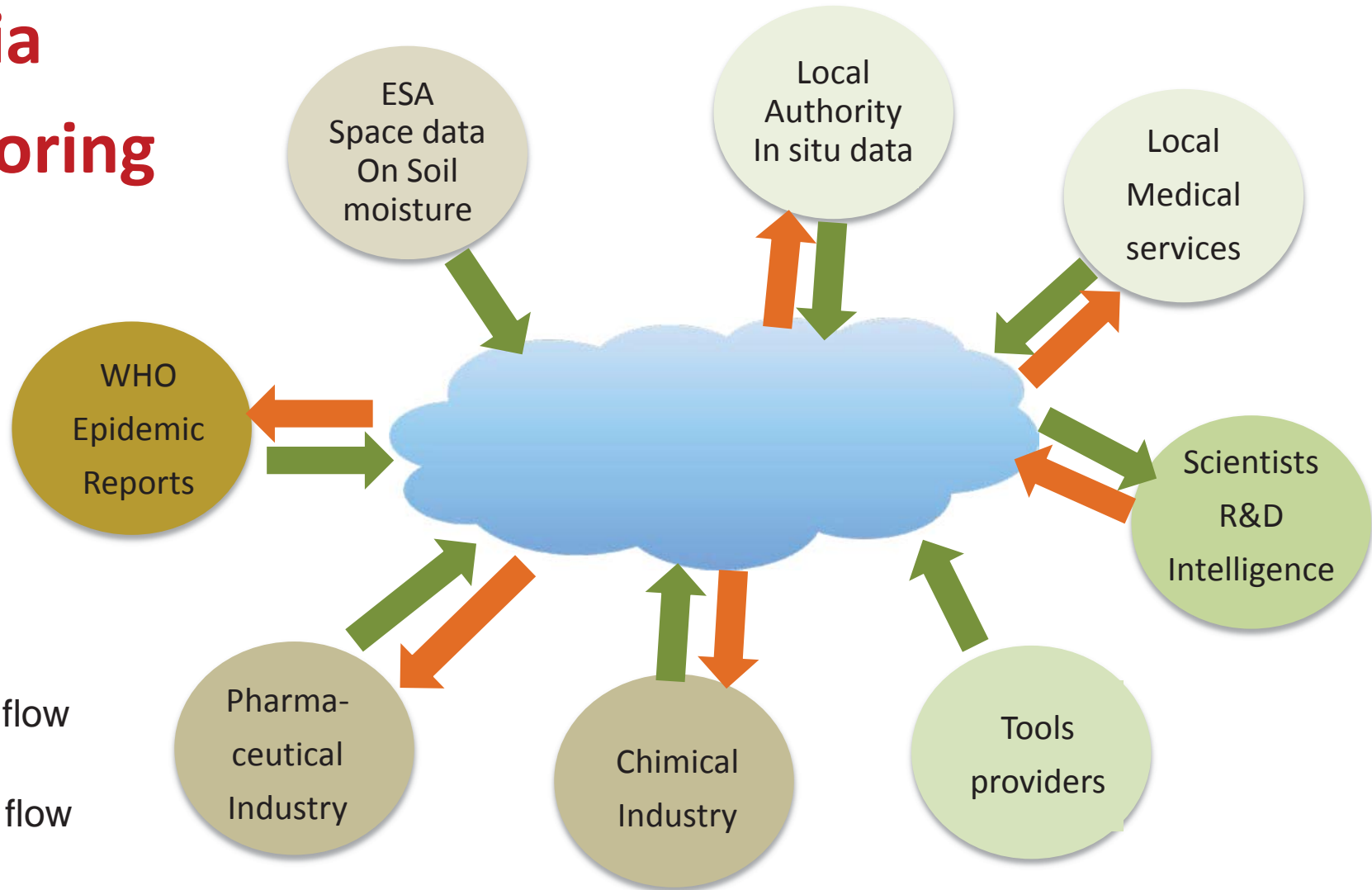NRENs have different commercial agreements (usually they apply a fee)
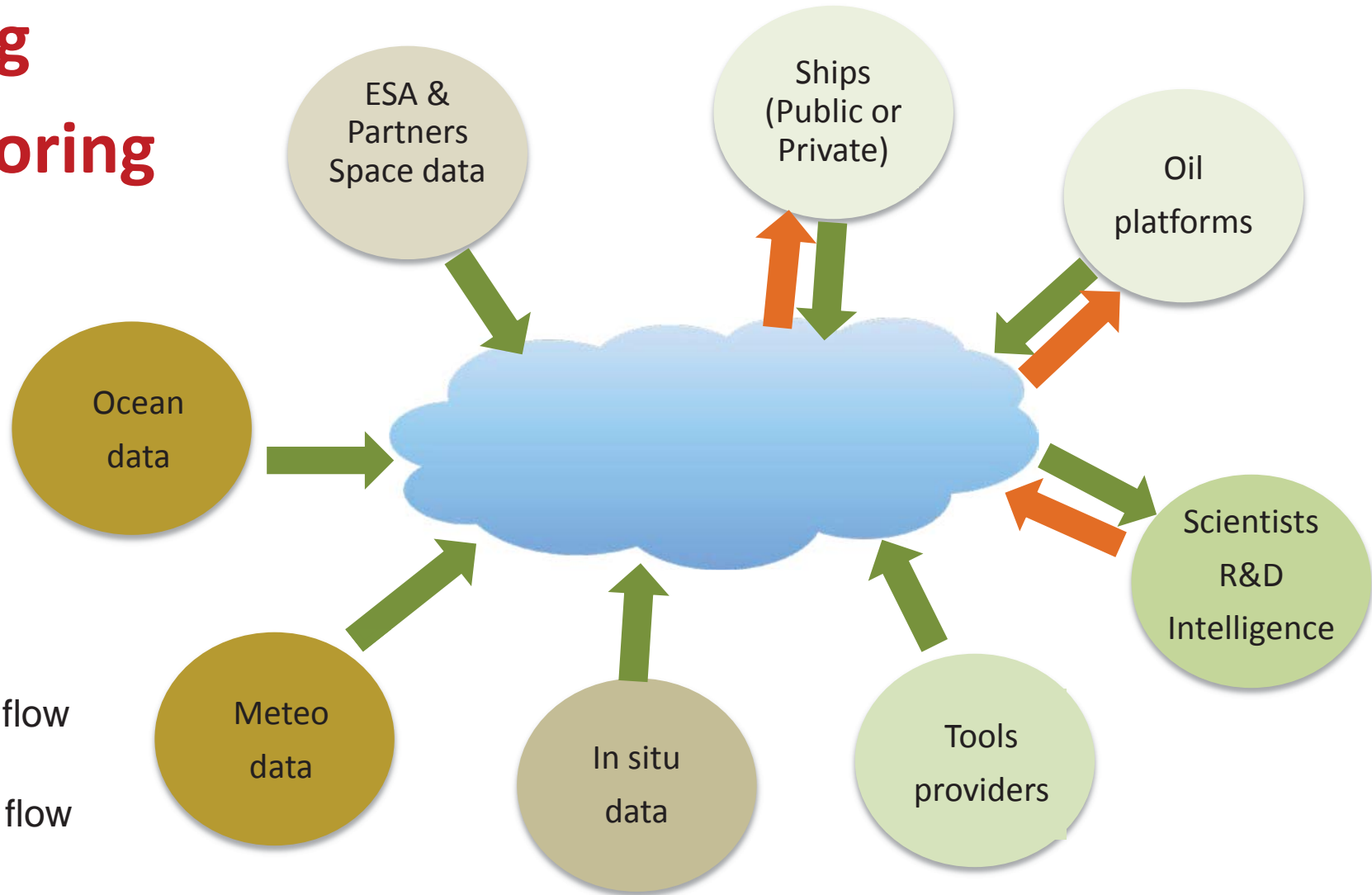
InfoaaS: Discovery driven ecosystem

Demand

Supplier A

Scientist

Funding bodies (€/$/£)

SME

Skills Brokerage

Data & tools

IT Brokerage

Discovery oriented approach

Skills brokerage: Dynamic team building based on discovery

Supplier

Supplier X

You want what you **discover** In an ever growing environment

Data provider

Supplier SME

Many-to-many relationships

Malaria Monitoring

Many-to-many relationships

Iceberg Monitoring

- → Data/Tools flow
- → Information flow

Ocean data

ESA & Partners Space data

Ships (Public or Private)

Oil platforms

Meteo data

In situ data

Tools providers

Scientists R&D Intelligence

The Big Picture of Big Data
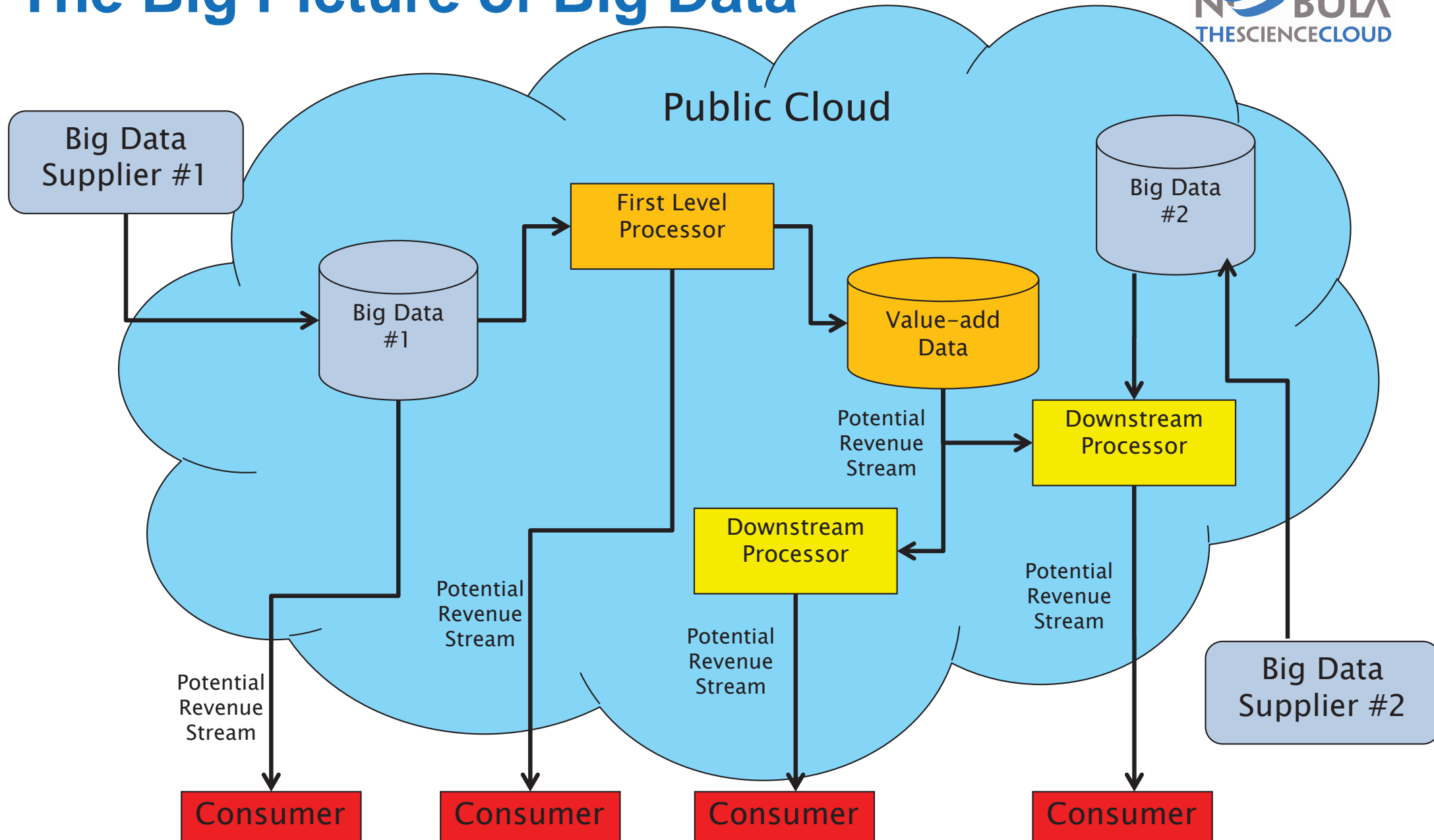
The Power of Federation

Each data provider remains

fully in control of the implementation of its data policy and of its IPRs

Helix Nebula		US Providers
Federation of Assets & competences, open		**Centralization** one platform, one provider
Exploitation of data, tools from all the federation	Versus	**Analytics** using only data & tools available on their own platform

Initial Flagship Use Cases

ATLAS High Energy Physics Cloud Use

To support the computing capacity needs for the ATLAS experiment

Genomic Assembly in the Cloud

A new service to simplify large scale genome analysis; for a deeper insight into evolution and biodiversity

SuperSites Exploitation Platform

To create an Earth Observation platform, focusing on earthquake and volcano research

- Scientific challenges with societal impact
- Sponsored by user organisations
- Stretch what is possible with the cloud today

ESA Pilot
InfoaaS using satellite data

Helix Nebula ensure generic IaaS provisioning , starting with the data source, e.g satellite - processing, -dissemination and –archiving.

Within HN, ESA focussed on stimulating a balanced development of science, public utility and commercial applications consistent with ESA obligations and objectives

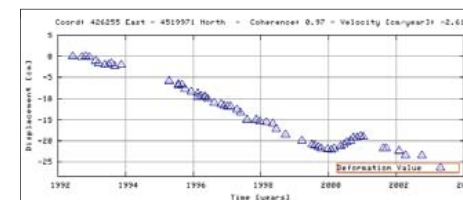# Supersites Exploitation Platform: Infrastructure concept for science use

Maryline Lengert, ESA
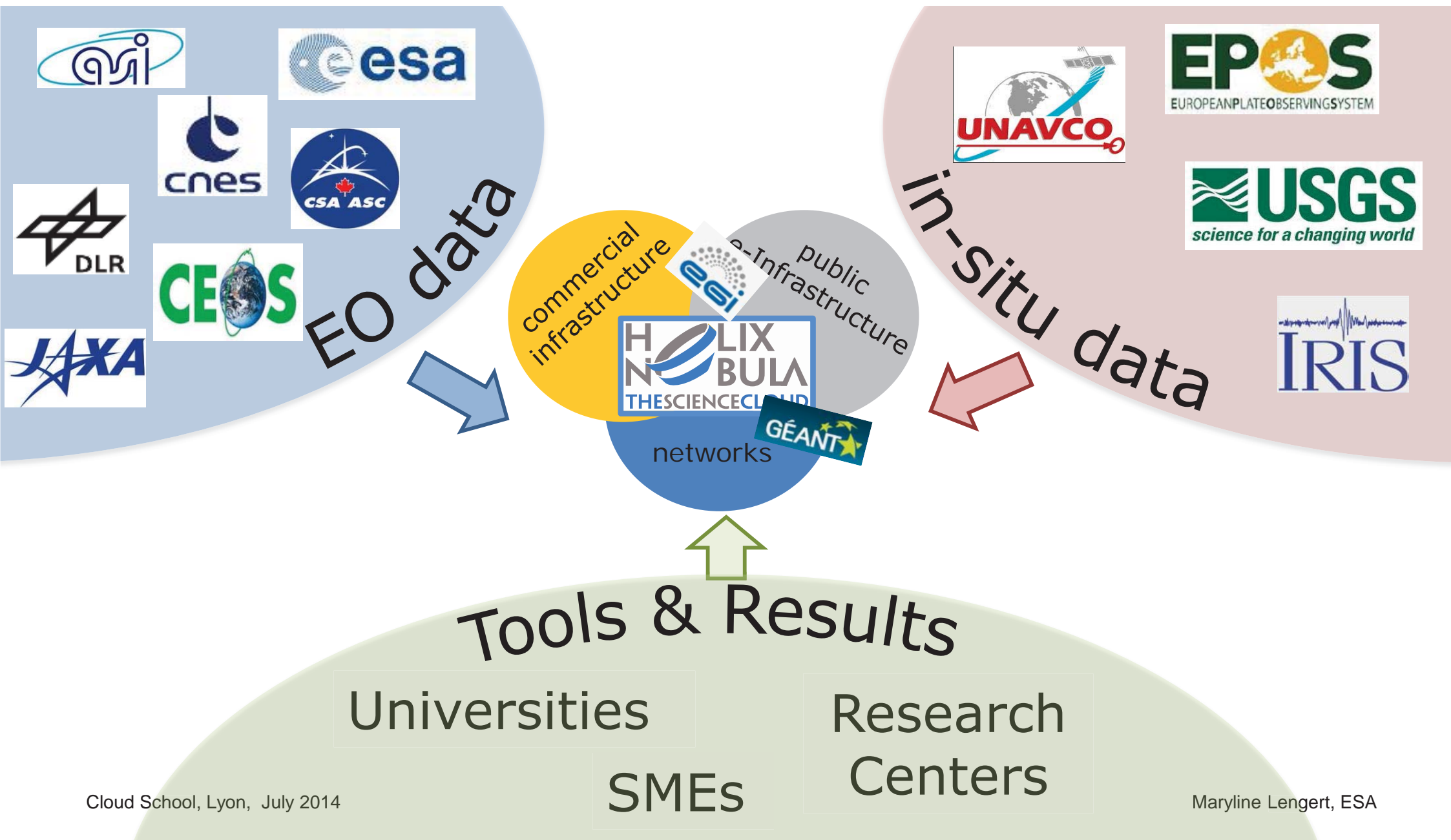
Ground displacement monitoring: using IPR developed by CNR Naples (IREA)

Variety of Data & tools to be **re-used** for many known and still unknown applications

Earthquakes

Volcanoes

Infrastructures
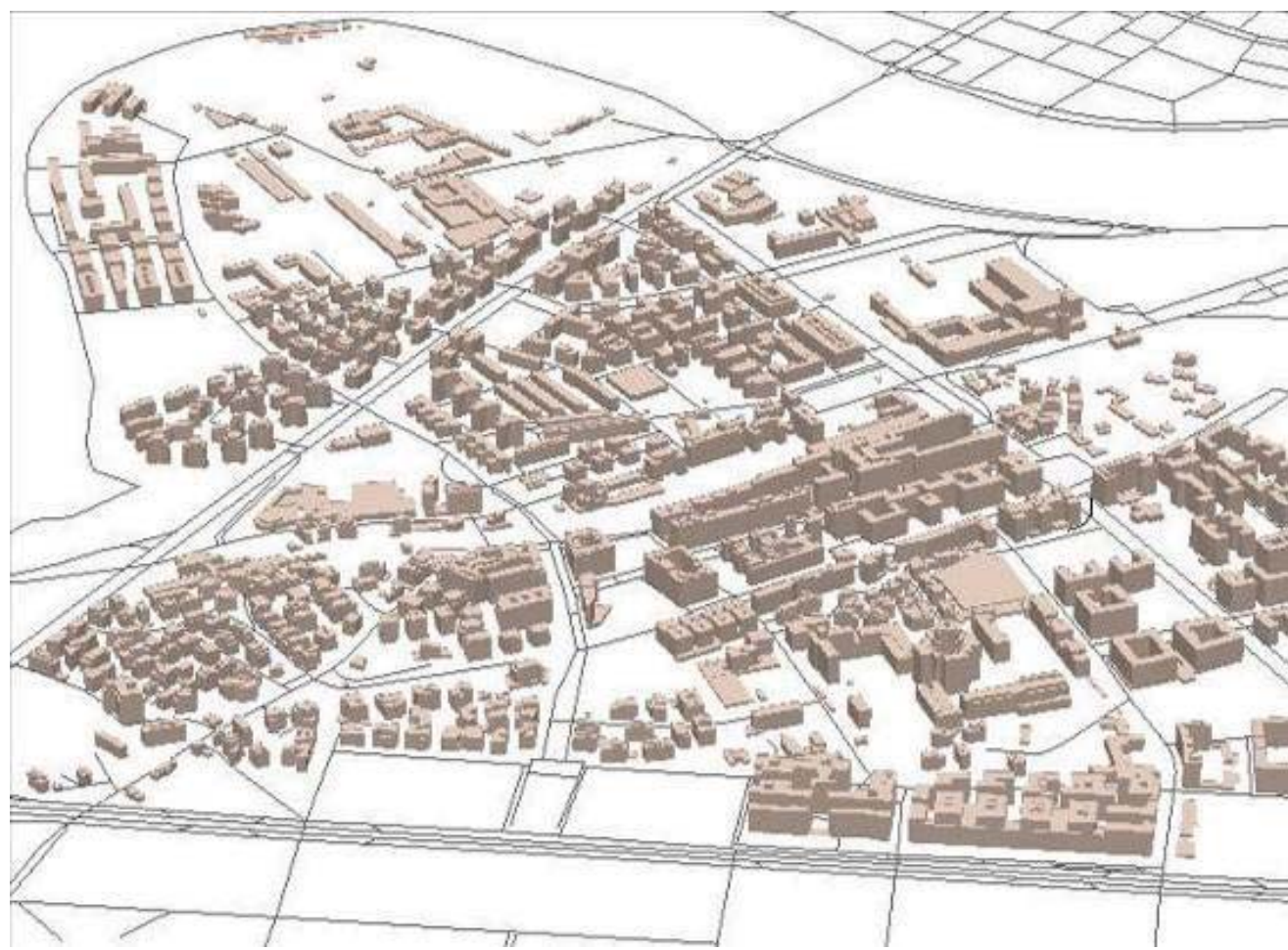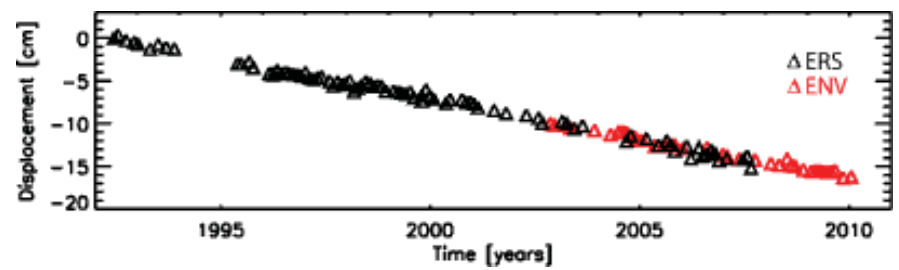
SBAS-InSAR Processing

Satellite SAR data set

Subsidence in Rome
SBAS-InSAR results

130 ERS/ENVISAT scenes acquired by descending orbits between 1992 and 2010
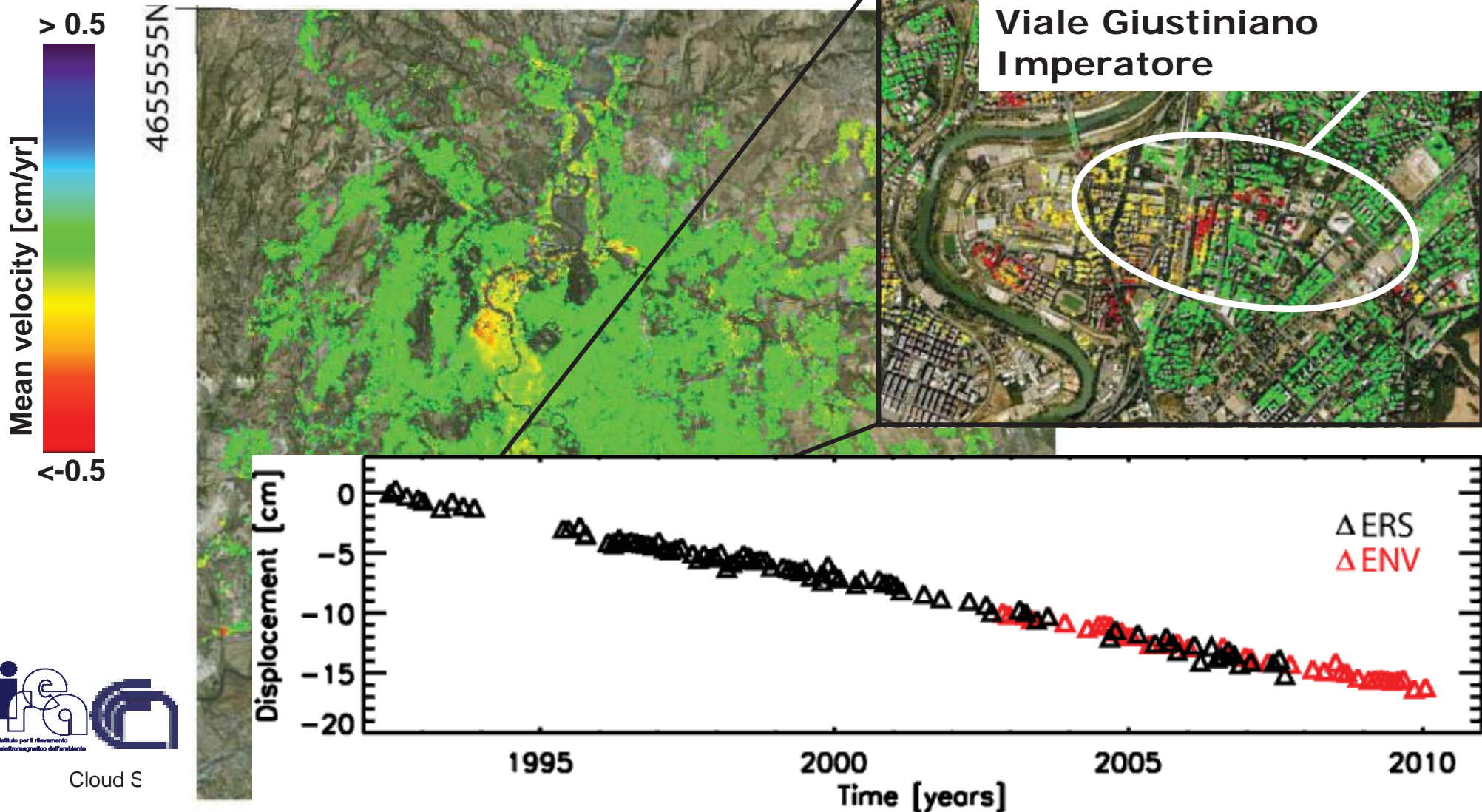
Viale Giustiniano Imperatore

Rome: Integration of SBAS-InSAR results and digital catalogues of buildings

Cloud School, Lyon, July 2014

Rome: Integration of SBAS-InSAR results and digital catalogues of buildings
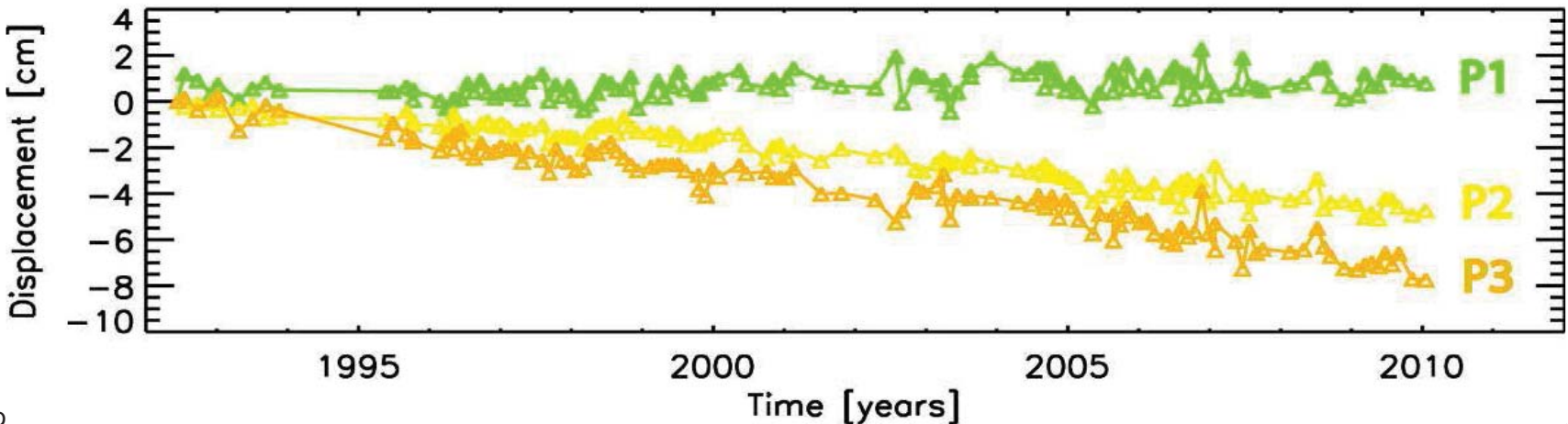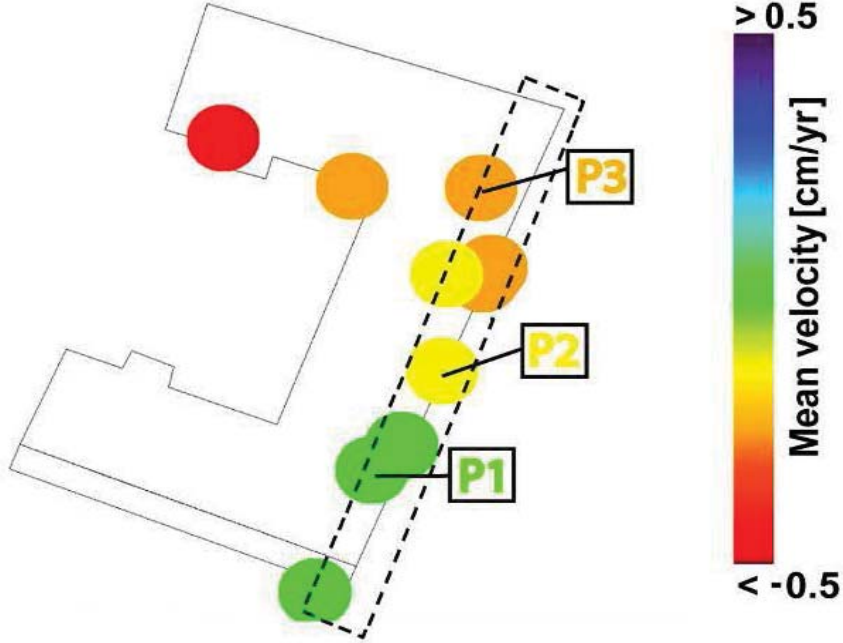
Rome: large scale damage assessment of buildings
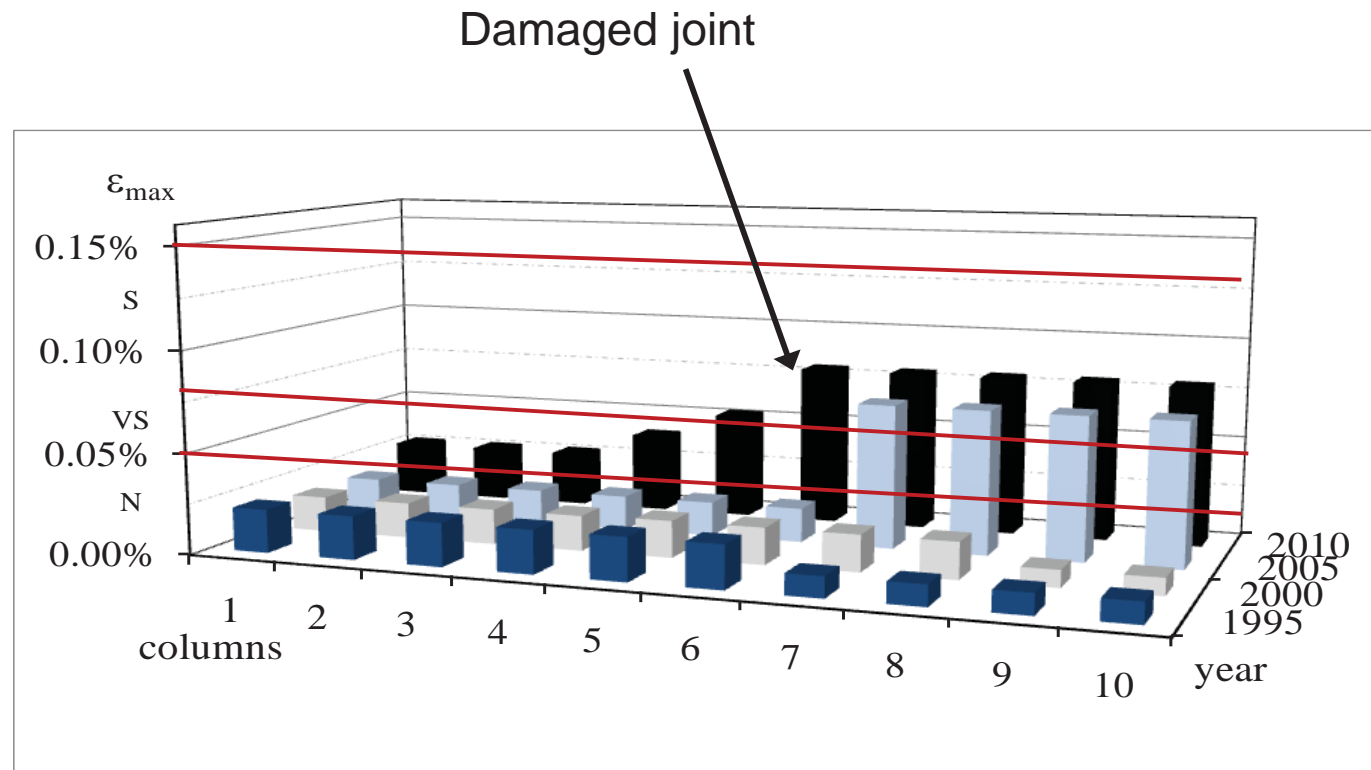
SBAS-InSAR: scientific use case

User (Scientist)

Web Interface

3rd Party Analysis Tool

SBAS-InSAR

Satellite Data (VA4)
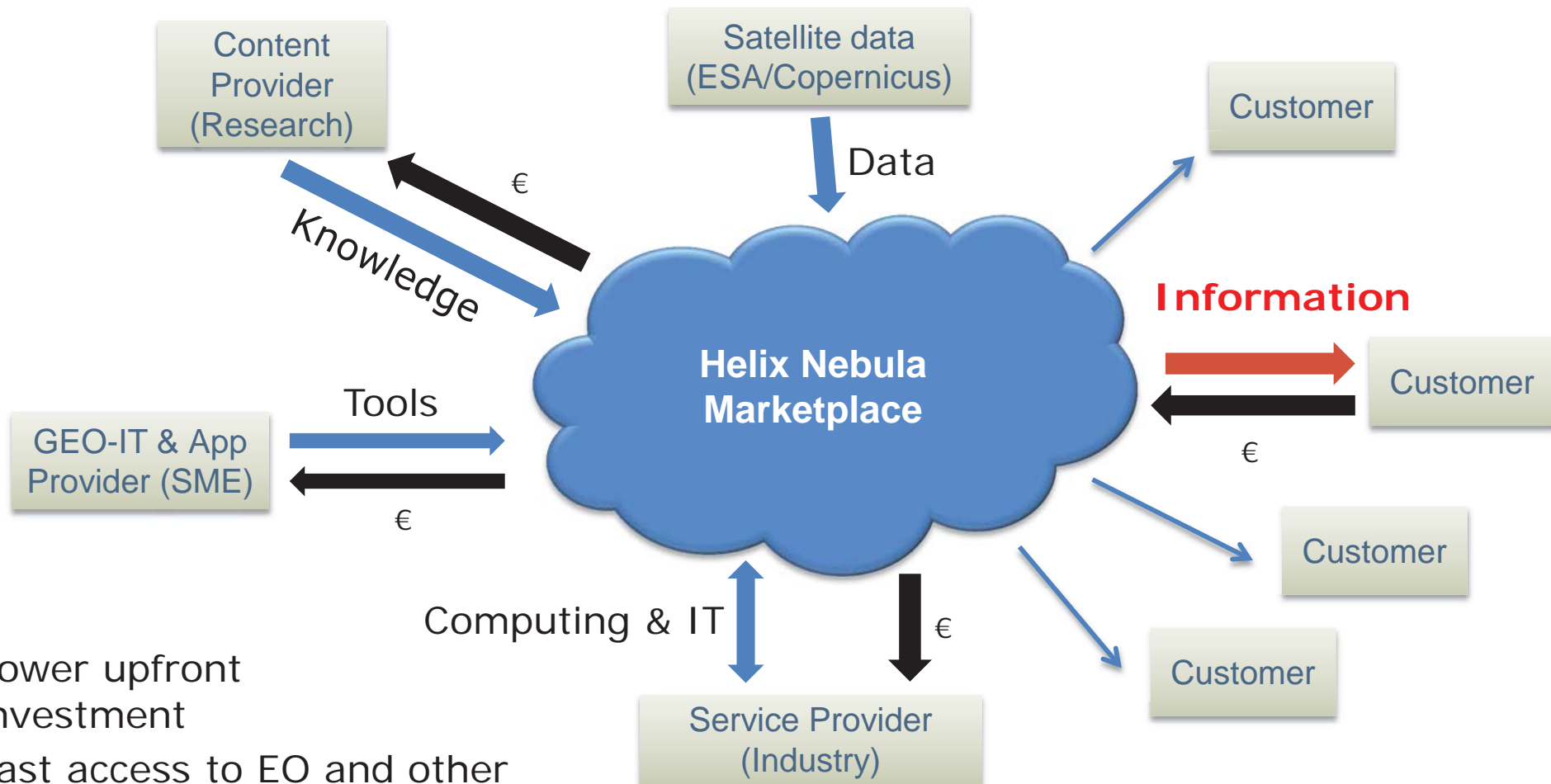
3rd Party Data

Knowledge

INFOaaS

Scientists support Tools, Interested parties (Public and/or Private Entities) covers computational costs

SBAS-InSAR: commercial use case

User (SME)

Knowledge

INFOaaS

PAYMENT DUE

Customer
(e.g. Company)

Web Interface

3rd Party
Analysis
Tool

SBAS-InSAR

3rd Party
Data

Satellite Data (VA4)
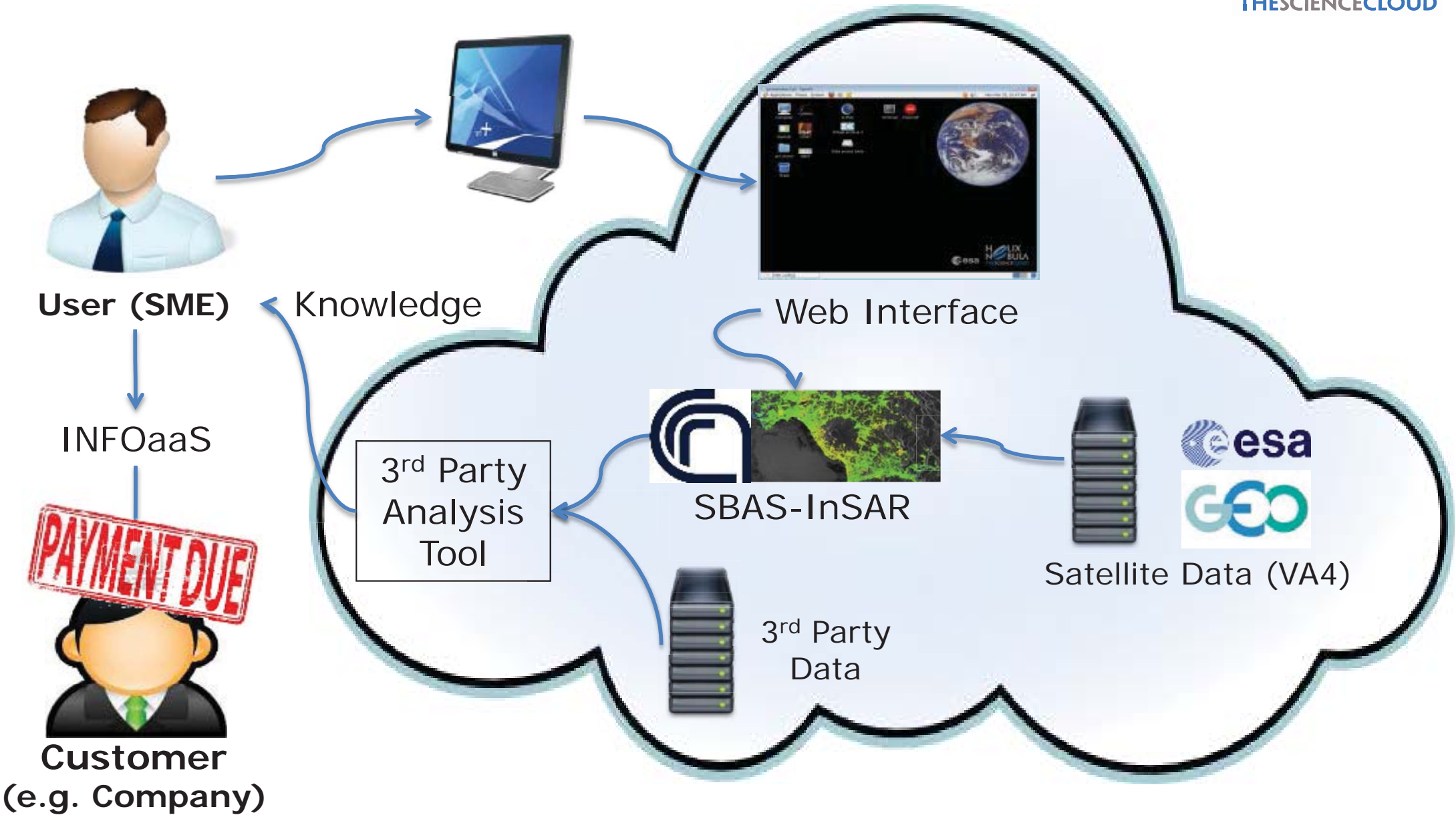
Every actor keeps control of its IPR - Customer pays for accessing the service provided

Information as a Service:
Science interfacing with private sector

- Lower upfront investment
- Fast access to EO and other geodata resources
- Disruptive technology

- **Risk and profit sharing**
- **Sustainability**

Summary

Helix Nebula Marketplace provides a multi-tenant '**Open Market Place for Science**', where data providers, scientists, funding bodies, SMEs and downstream industry can meet to work along common interests.

The Helix Nebula ecosystem implements many-to-many relationships, quickly being established, to transform data into valuable information

www.helix-nebula.eu

Thanks!