How the Integrated Applications Promotion (IAP) Programme Can be Used to Develop Solutions with EO Components

Ian Downey

UK IAP Ambassador Platform

NCEO – CEOI Joint Science Conference

Sheffield, 27th June 2014

ECSAT

- **European Centre for Space Applications and Telecommunications (ECSAT)**
  - Harwell Science, Innovation and Business Campus, Oxfordshire
  - c. 100 ESA employees will be based in Harwell by 2015
- ECSAT will support activities related to telecommunications, integrated applications, climate change, technology and science.
- ECSAT is built around and will be drawing maximum benefit from cooperation with organisations located on or linked to the Harwell campus.
  - Satellite Applications Catapult (hosts UK-AP), RAL, UKSA, TSB
  - Complemented by ESA Business Incubation Centre (BIC) Harwell
- ECSAT will be working with communities in all Member States of ESA.

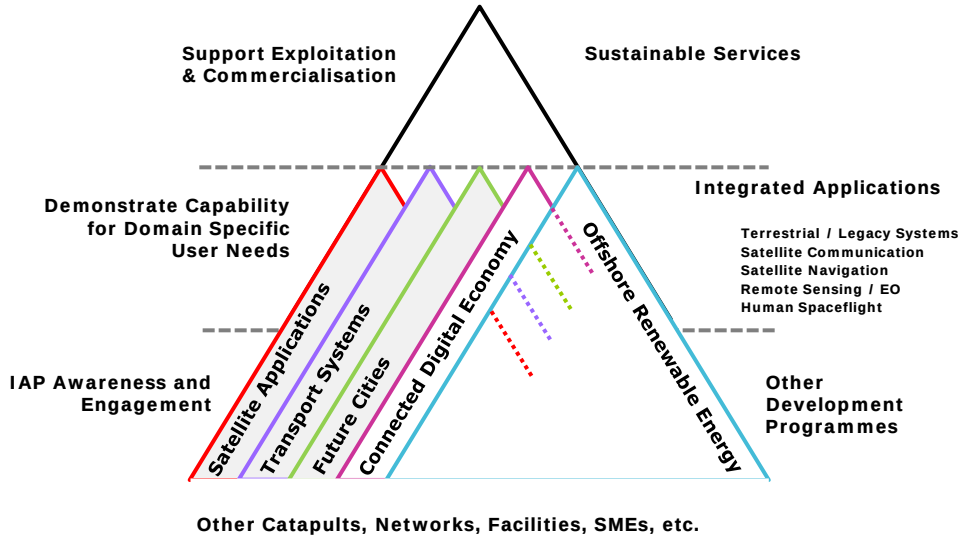
IAP & Catapult Network

CATAPULT

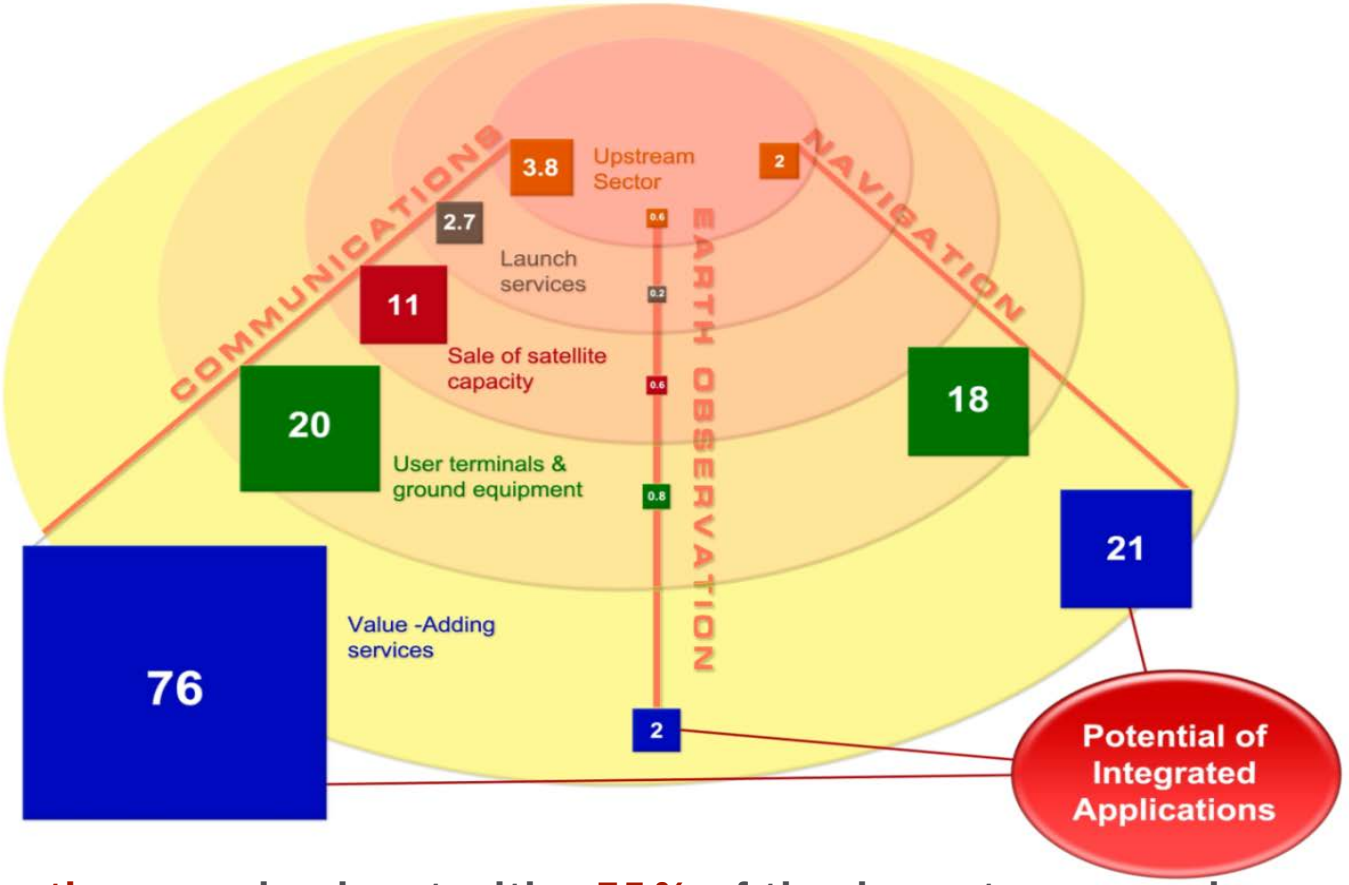
Cell Therapy	Connected Digital Economy	Future Cities	High Value Manufacturing	Offshore Renewable Energy	Satellite Applications	Transport Systems	Energy Systems	Precision Medicine

- UK Ambassador Platform hosted 50% at ESA ECSAT, Harwell UK
  - Embedded in Space Applications Catapult
  - Linkage with related Catapults
    - Offshore Renewable Energy
    - Transport Systems
    - Future Cities
    - Connected Digital Economy
  - Other Potential Partners

  - Raising awareness
    - User / stakeholder engagement
    - Workshops, conferences, publications
    - Online Portal



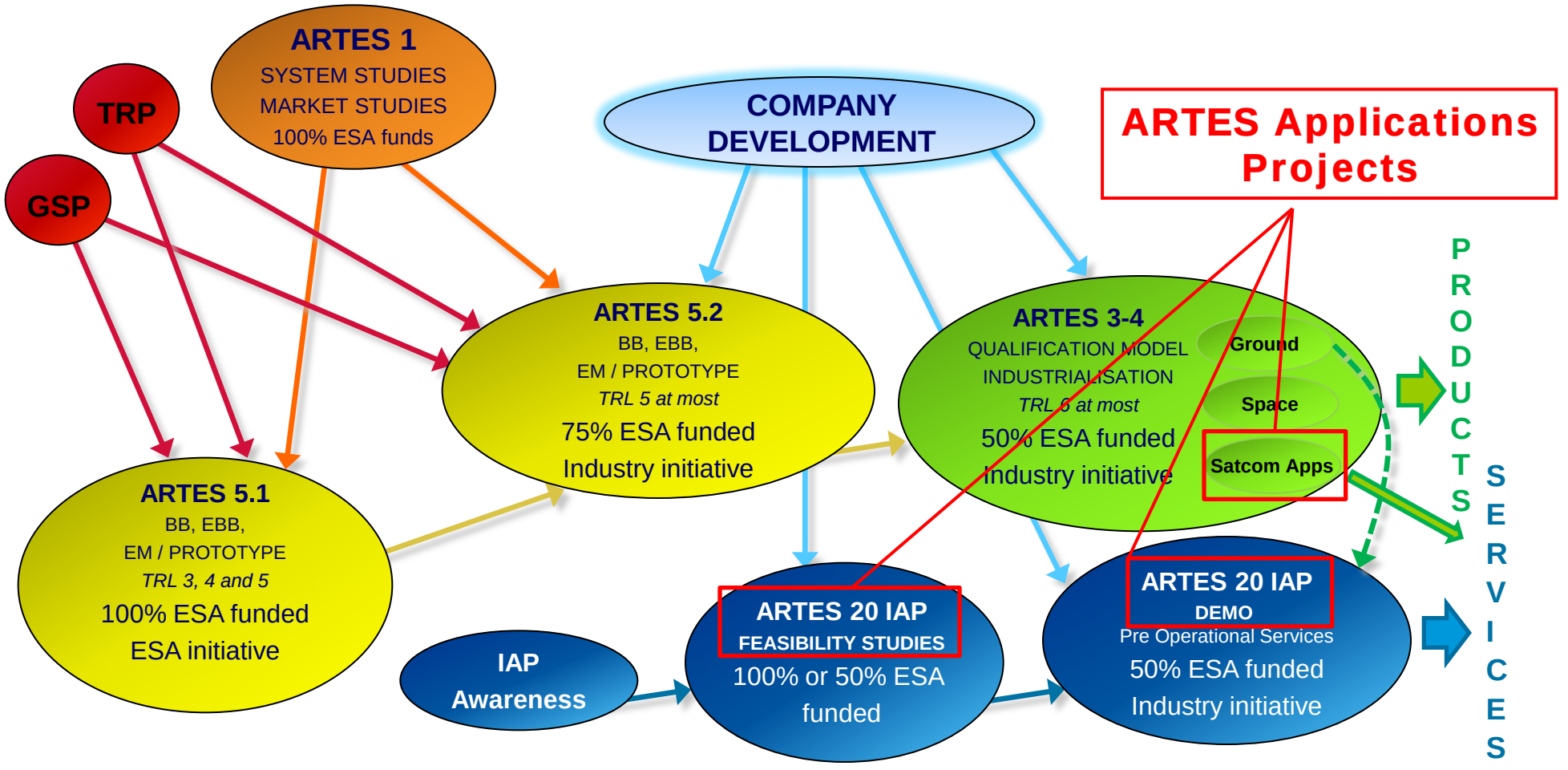
The Three Value Chains in Commercial Satellite Applications: Global Space Market Revenue in US$Bn



1. **Sat communications** are dominant with **>75%** of the downstream services revenue
2. **Navigation** is emerging **21%**
3. **EO** is currently **2%**

Source: Euroconsult & GSA, 2010

The ecosystem of the ARTES Generic Envelope Programme Elements (non mission specific)



GSP: General Studies Programme
TRP: Technology Research Programme
ARTES: Advances Research in TElecommunications Systems
IAP: Integrated Applications Promotion
TRL: Technology Readiness Level

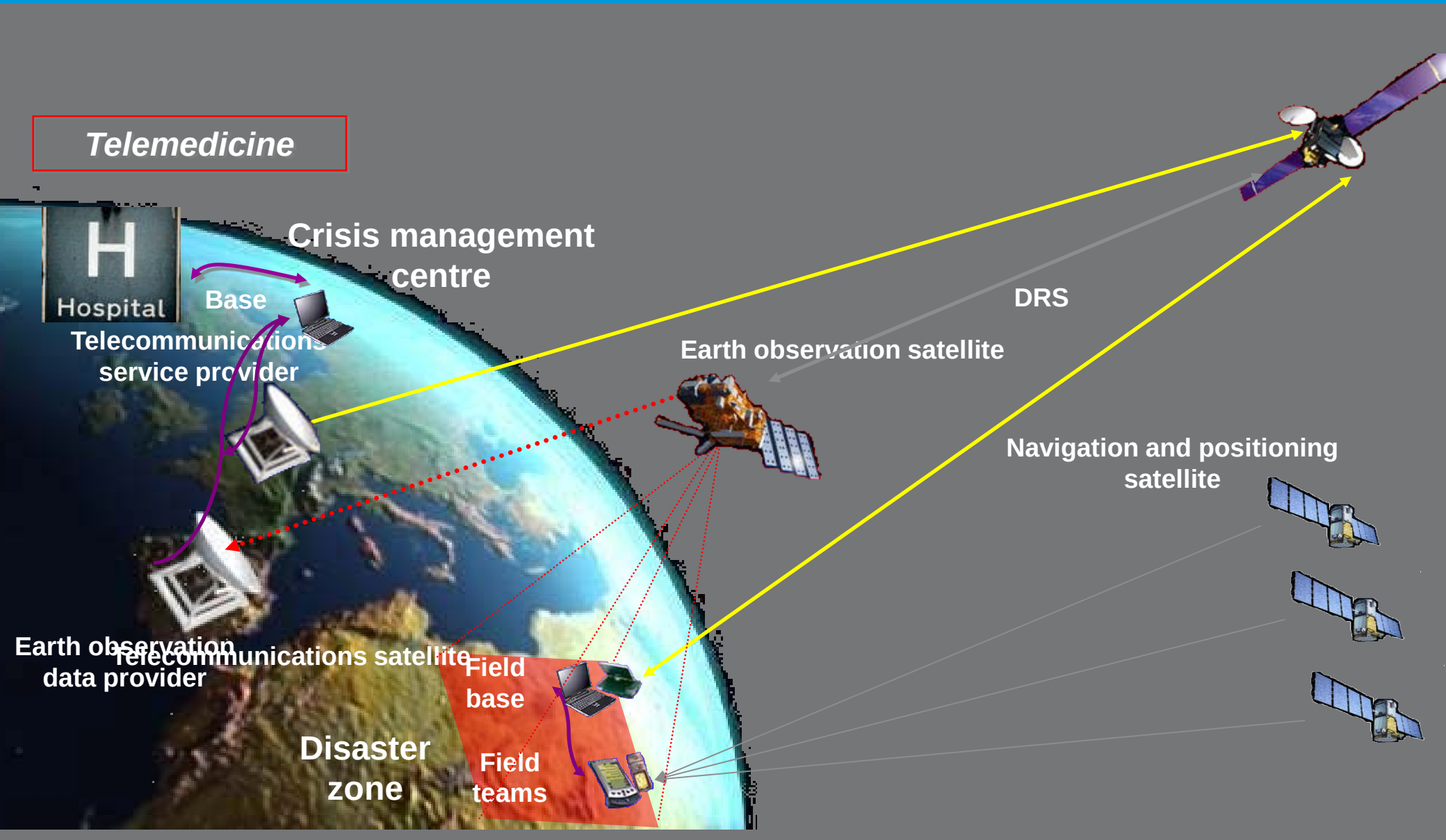
IAP Objectives

- A user-driven programme for delivering space-based services and applications to new user communities
- To develop operational services for a wide range of users by combining different systems.
- Responding to actual user needs, emphasising sustainable applications and services;
- Active engagement with multiple sectors and communities;
- Use of existing space assets: current / enhanced capacity;
  (≥2 from: Satcoms, Satnav, Earth Observation, Human Space Flight)
- Combining multiple existing space assets with terrestrial systems

Active studies and projects, with many more pending across a wide range of sectors

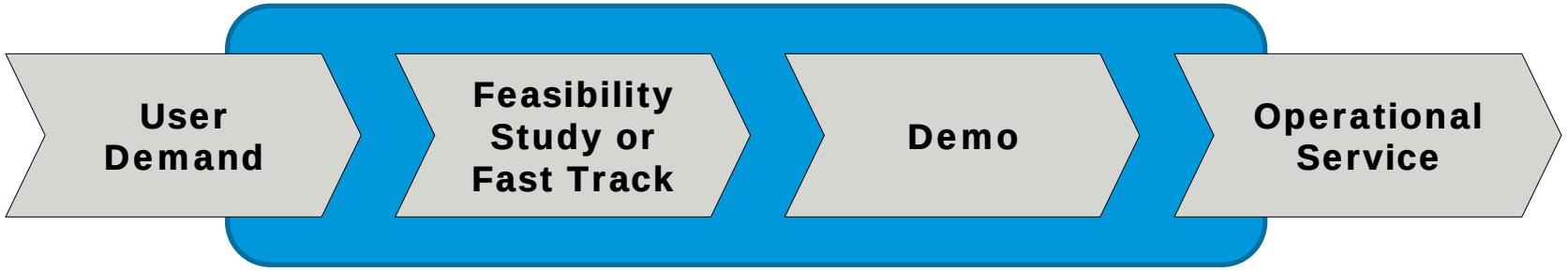
Transport Health Safety Energy Development …

IAP System of Systems example



Development of Services Supported by IAP

ESA IAP Involvement



User Demand	Feasibility Study or Fast Track	Demo	Operational Service
User with demand but not contact with Industry. Contact with ESA ✓ Iap.esa.int ✓ Conferences ✓ Ambassadors ✓ Call for User Ideas	Funding by ESA ✓ 100 % when ESA initiated ✓ 50 % when partner/-user initiated ✓ ESA Prize ✓ Average ESA funding €200k, max €250k	Funding by ESA ✓ 50 initiated by either ESA or industry ✓ Average ESA funding €0.9m but no fixed upper limit	Support ✓ Promotion, etc.

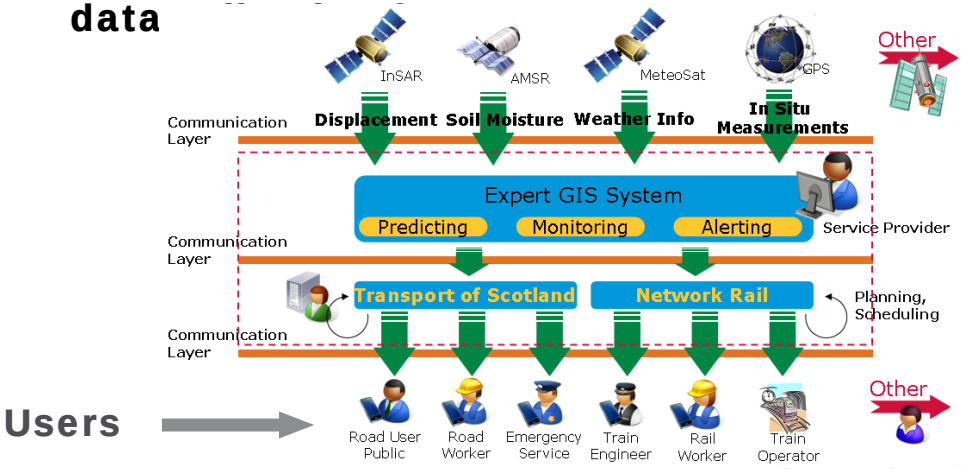
LiveLand:
Modelling, Predicting and Alerting of Lanslides and Subsidence affecting Transport Infrastructure

Objective of the Feasibility Study

- the study assesses the feasibility of using space based assets to assist
  - in developing models that can accurately predict landslides and subsidence,
  - monitoring and alerting systems in order reduce damage

Added-value of space

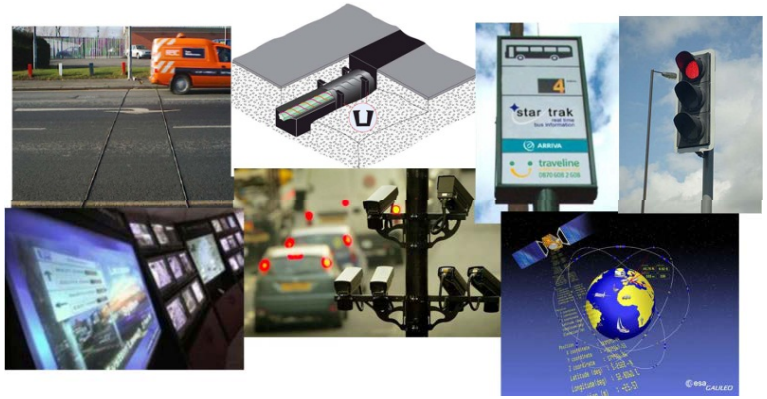
- Earth Observation capabilities include the measurement of terrain movement and deformation, vegetation and soil moisture. Also weather (precipitation) information is relevant.
- Satellite navigation can be introduced to locally determine terrain movement, and tracking and tracing of emergency units.
- Satellite communications may be required for data

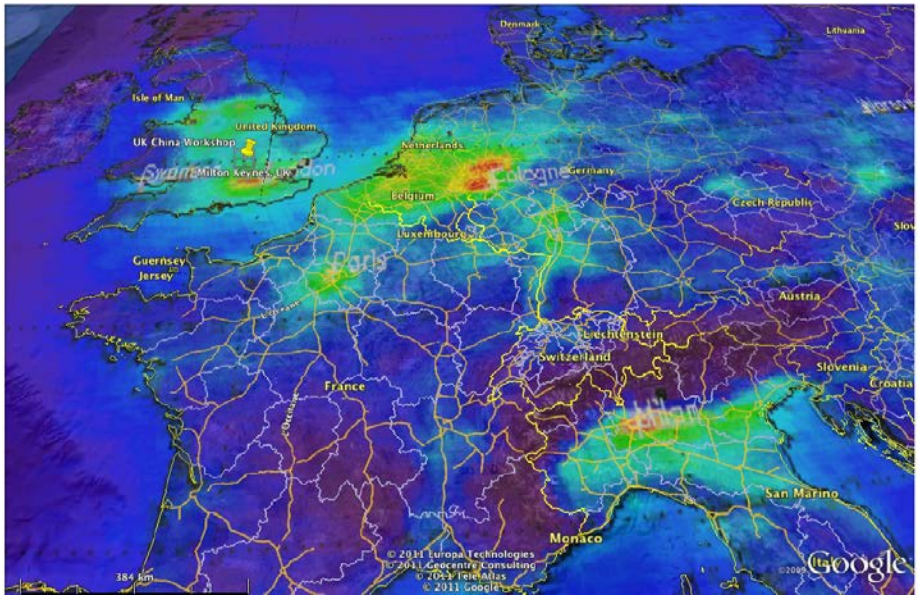


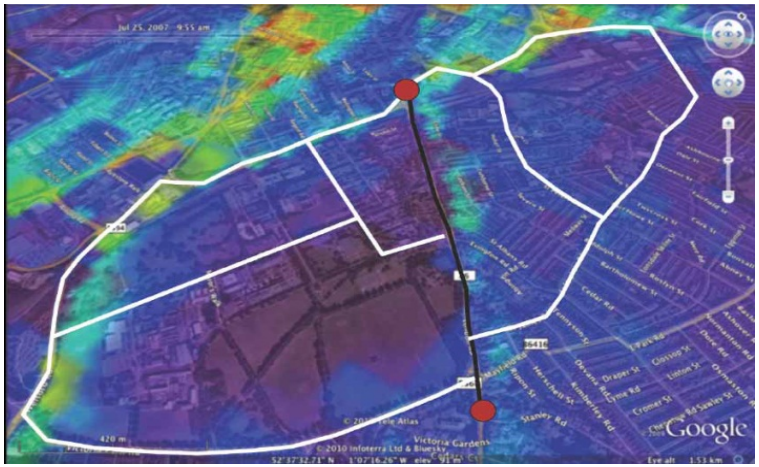
iTRAQ
Air Pollution and Traffic Congestion

User Needs

- **Traffic Management**
  - ***Maintain existing rate of travel over next 4 years***
- **Air Quality**
  - ***Reduce current levels of nitrogen dioxide***
- **Carbon Footprint**
  - ***Reduce city wide carbon dioxide emissions***
- **Demo activity in progress to develop full readiness**







iTRAQ

INTEGRATING TRAFFIC CONTROL & AIR QUALITY

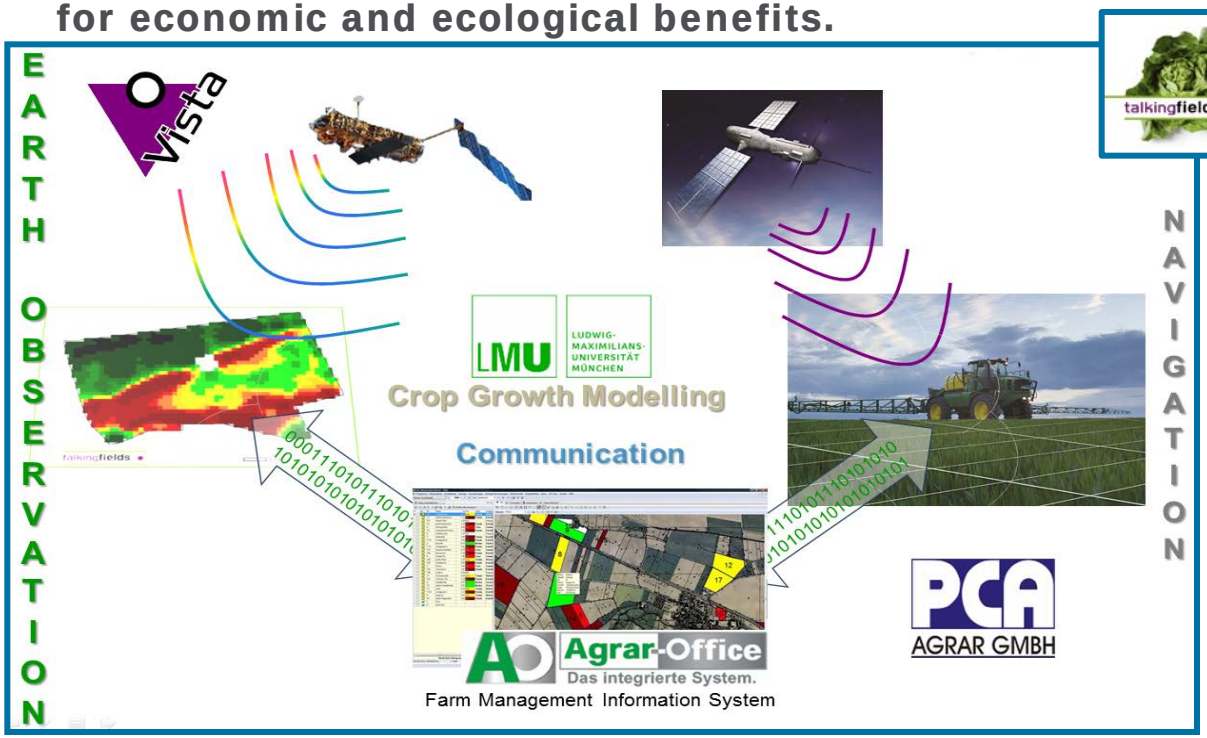
European Space Agency

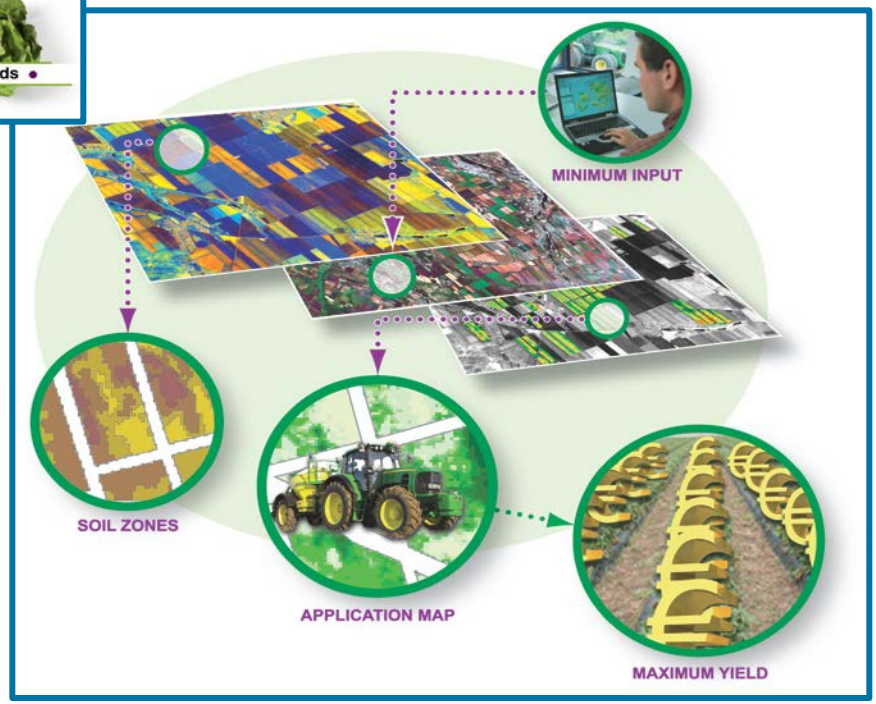
TalkingFields
Optimising agricultural production using integrated satellite techniques

Aims: to increase efficiency of agricultural production via precision farming by means of geo-information services. It integrates space and ground-based assets to achieve this

GPS satellites support site-specific seeding, fertilization, plant protection and yield mapping through global navigation services.

Satellite images monitor crop status and help farmers to manage their fields in the best way for economic and ecological benefits.





Status: The study completed on 14th April 2014; now operating as a commercial service.
Project Web Page: http://artes-apps.esa.int/projects/talkingfields, www.talkingfields.de

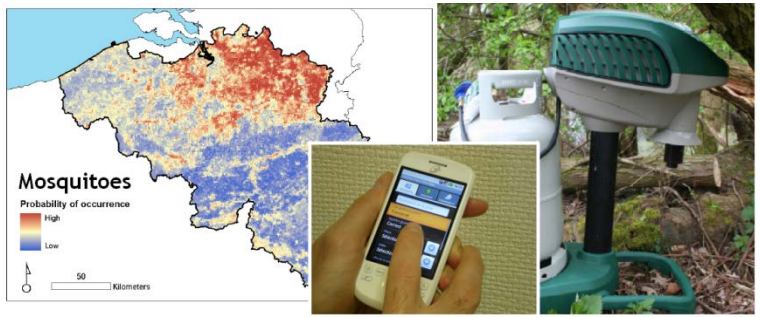
VECMAP

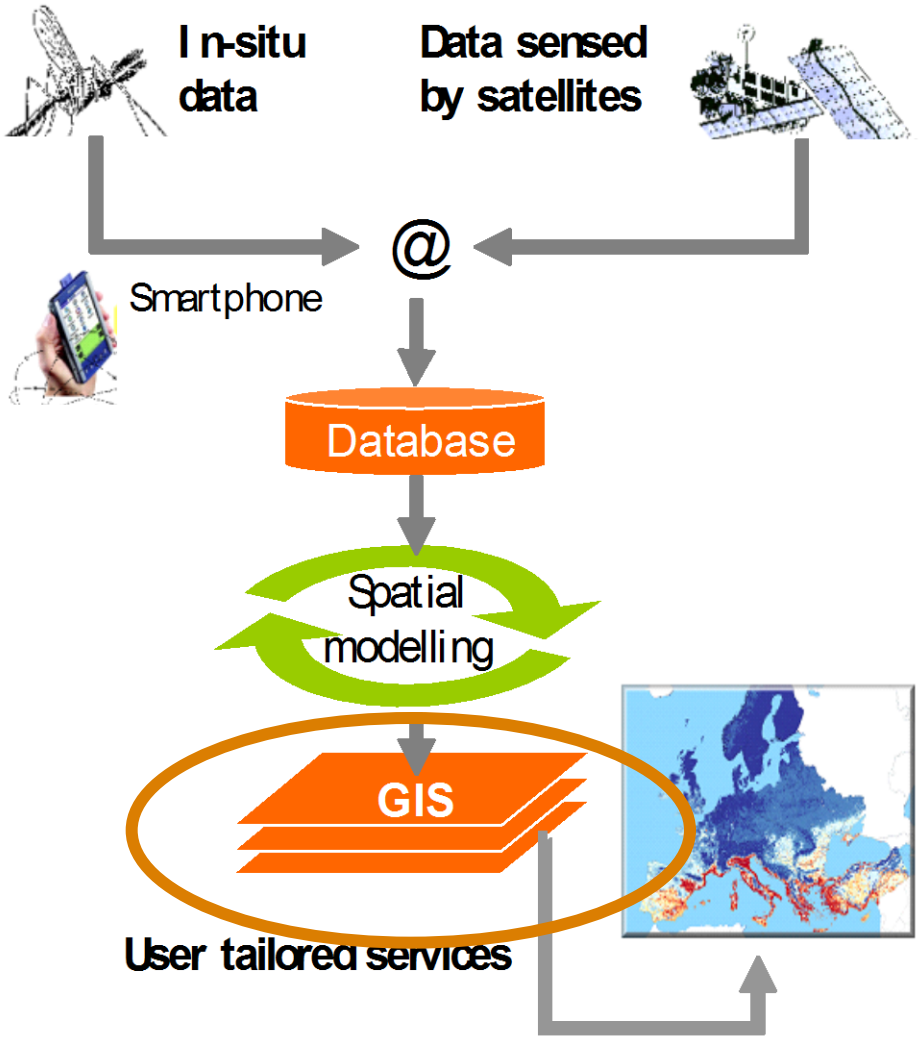
VECMAP Services

- Sampling strategy & routing service
- Field-data synchronization with dBase incl. GNSS position
- Synchronization of laboratory data
- Continuous set of processed EO data
- Habitat suitability mapping service
- Landscape suitability mapping service
- GIS & raster functions by web interface

VECMAP Demonstration Project (2011-13)

- Following successful feasibility study and system demonstration
- Mosquitoes, ticks, midges, mammals
- Demo services in 12 countries

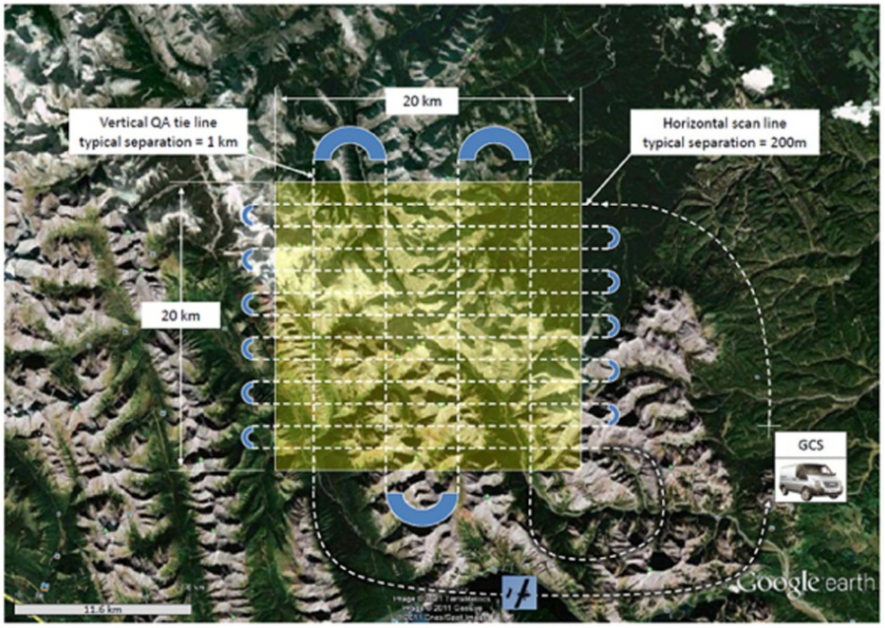


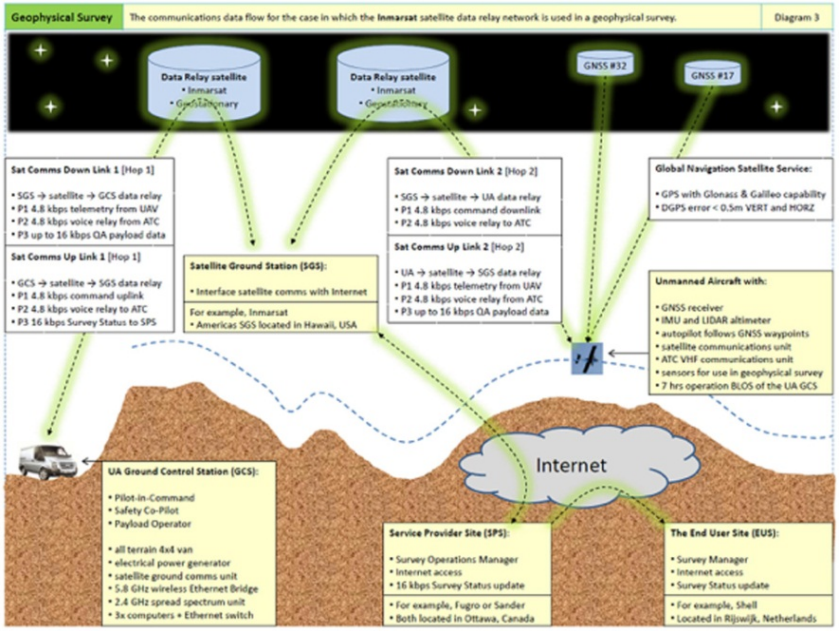


SURMON

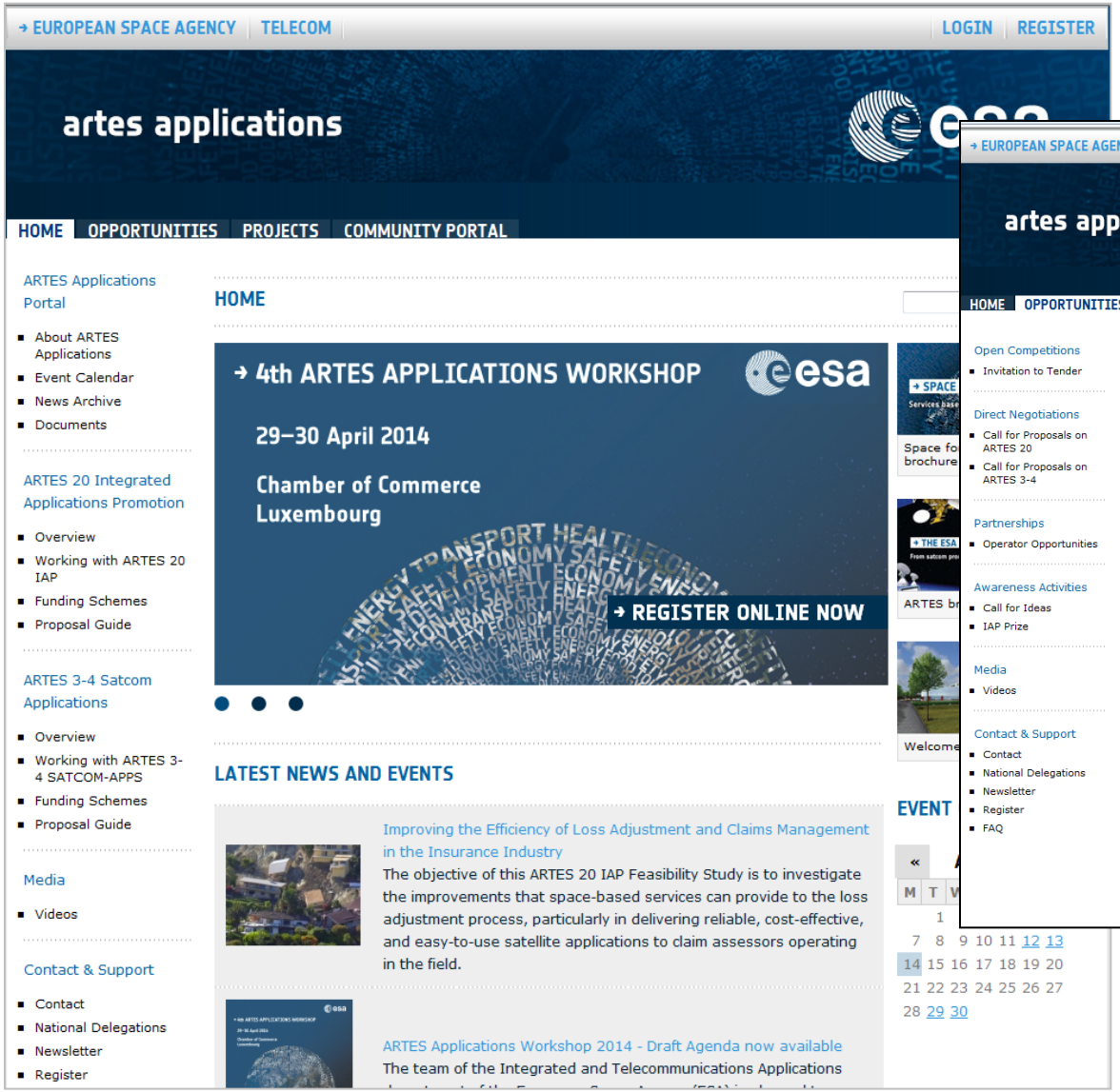
- Airborne geophysical survey and oil & gas pipeline monitoring services based on Remotely Piloted Aircraft (RPA), making use of satellite communication and navigation, operation beyond line-of-sight is enabled.
- Geophysical Survey (Canada)
- Pipeline Monitoring (Norway) services

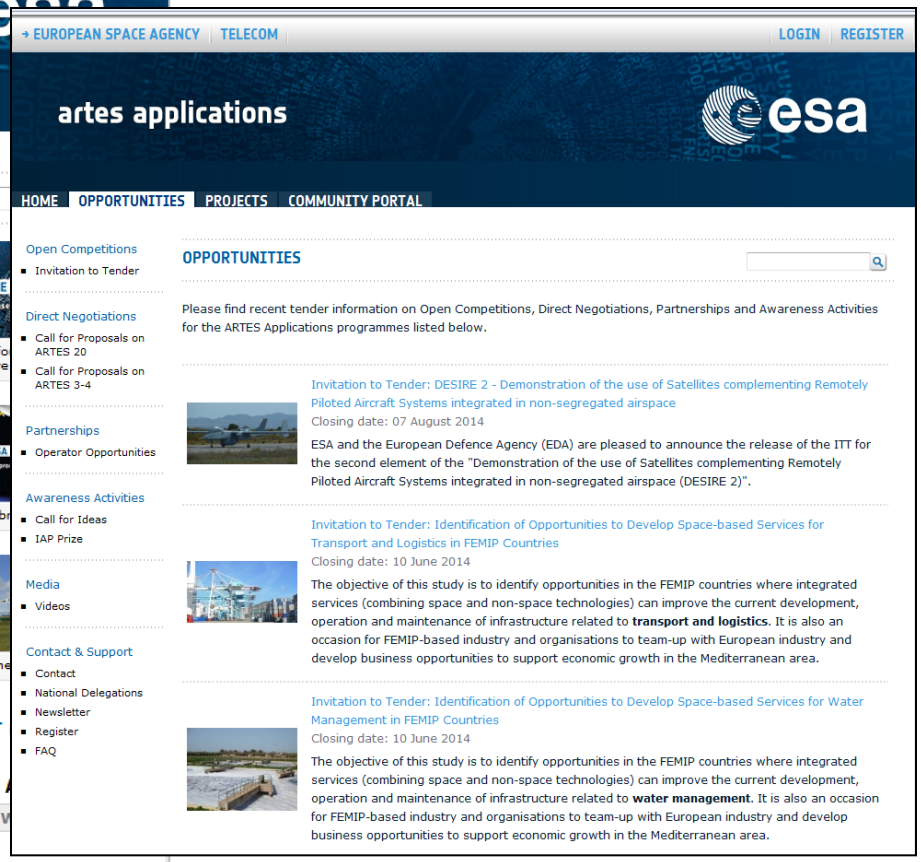
- Improved resolution
- Day & night ops
- NRT payload access
- Control BLOS
- Cost reductions





IAP Portal
http://artes-apps.esa.int
http://artes-apps.esa.int/ARTES-APPS-2014





Imminent & Current IAP Open Competitions

1. Issued:
   - AO7904 DeSIRE 2 : joint ESA - EDA RPAS demonstration to develop and demonstrate a service based on a Remotely Piloted Aircraft (RPA) flying in Beyond Radio Line of Sight (BRLOS) using space assets (SatCom, SatNav), Closes 07/08/2014

2. Intended:
   - 14.1AA.01 Space Applications in Support of Future Cities FS ARTES 20
   - 14.1AA.04 New Space Applications Supported by Open Data and Crowd Sourcing - FS ARTES 20
   - 14.1AA.03 SBS-RAILS FS ARTES 20 Space Based Services for Railway Signaling (SBS-RAILS)

3. For all ARTES applications activities, satcom capacity is available under special conditions from several operators (e.g. Hylas/Avanti and SES Astra).

Contact Points

- IAP Website and Ambassador Platforms http://artes-apps.esa.int
- Open Call for proposals, EMITS: http://emits.esa.int (ITT AO6124)
- Handbook, http://artes-apps.esa.int/handbook

- ARTES Workshop http//artes-apps.esa.int/ARTES-APPS-2014

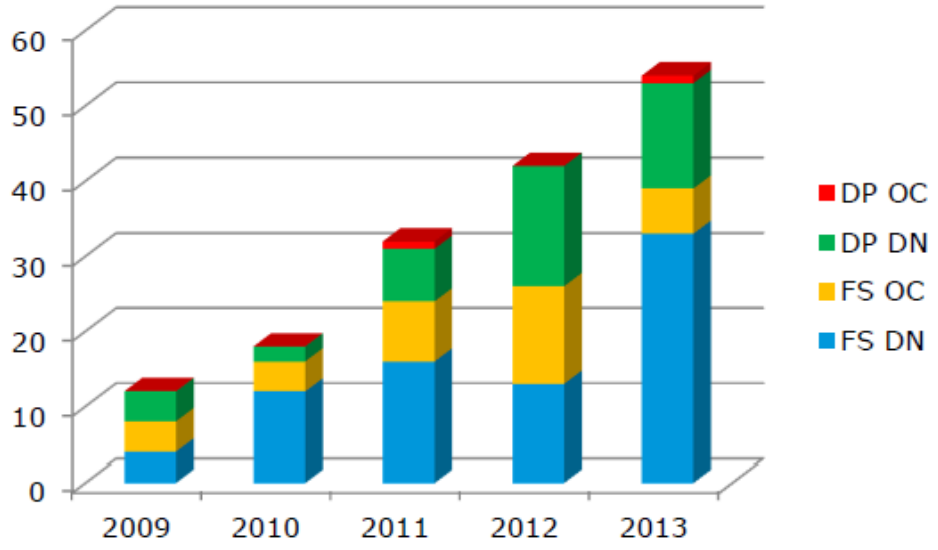
- Contacts for IAP Awareness:
  - Ian.Downey@esa.int
  - ☎ +44 1235 444 319
  - Tony.Sephton@esa.int
  - ☎ +44 1235 444 310
- Contacts for Applications Business:
  - Alan.Brunstrom@esa.int
  - ☎ +44 1235 444 315

ARTES 20 – Integrated Applications Programme Status end 2013

Phase 1: 2009 – 2013 ⇒ 58,60 M€

Phase 2: 2013 – 2016 ⇒ 80,03 M€

Activities approved by JCB



	FS	DP
Health	9	6
Safety and Security	42	10
Transport	22	13
Energy	10	5
Environment	23	2
Other areas	7	9
Total	113	45

	FS DN	FS OC	DP DN	DP OC	
2009	4	4	4	0	12
2010	12	4	2	0	18
2011	16	8	7	1	32
2012	13	13	16	0	42
2013	33	6	14	1	54
	78	35	43	2	158

ARTES Applications Programmes (Advanced Research in Telecoms Systems)

- ARTES 20 Integrated Applications Promotion **(IAP)**
  - Focus on user-driven applications (market pull, not technology push)
  - Integrate different space & terrestrial systems to develop solutions
  - Continuously open call, plus competitions focused on specific topics.

- ARTES 3-4 Applications **(Satcom Apps)**
  - Development of satcoms-based applications
  - Created as one element of a combined ARTES 3 and 4 programme
  - Over 150 satcoms apps projects since 1998, many via ARTES 3, 4 or 5
  - Also applications for satellite programmes like Alphasat and Hylas
  - Continuously open call, 50% funding.

- ARTES 21 Satellite Automatic Identification System **(SAT-AIS)**
  - Enhancement of satellite systems to complement terrestrial AIS
  - Also uses ARTES 5 (for technology) and ARTES 20 (for applications).