# ARTES Applications Programmes

N. Hübner (ESA)
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# PURPOSE OF ESA

"To provide for and promote, for exclusively peaceful purposes, cooperation among European states in **space research** and **technology** and their **space applications.**"

**Article 2 of ESA Convention**

# ESA FACTS AND FIGURES

- Over 50 years of experience
- 22 Member States
- Eight sites/facilities in Europe, about 2200 staff
- 4.4 billion Euro budget (2015)
- Over 80 satellites designed, tested and operated in flight
- Over 20 scientific satellites in operation
- Six types of launcher developed
- 200th launch of Ariane celebrated in February 2011

# 22 MEMBER STATES AND GROWING

**ESA has 22 Member States:**
**AT, BE, CH, CZ, DE, DK, EE, ES, FI, FR, IT, GR, HU, IE, LU, NL, NO, PT, PL, RO, SE, UK**

Six other EU states have Cooperation Agreements with ESA: Slovenia, Cyprus, Latvia, Lithuania, Malta and the Slovak Republic. Bulgaria is negotiating a Cooperation Agreement.

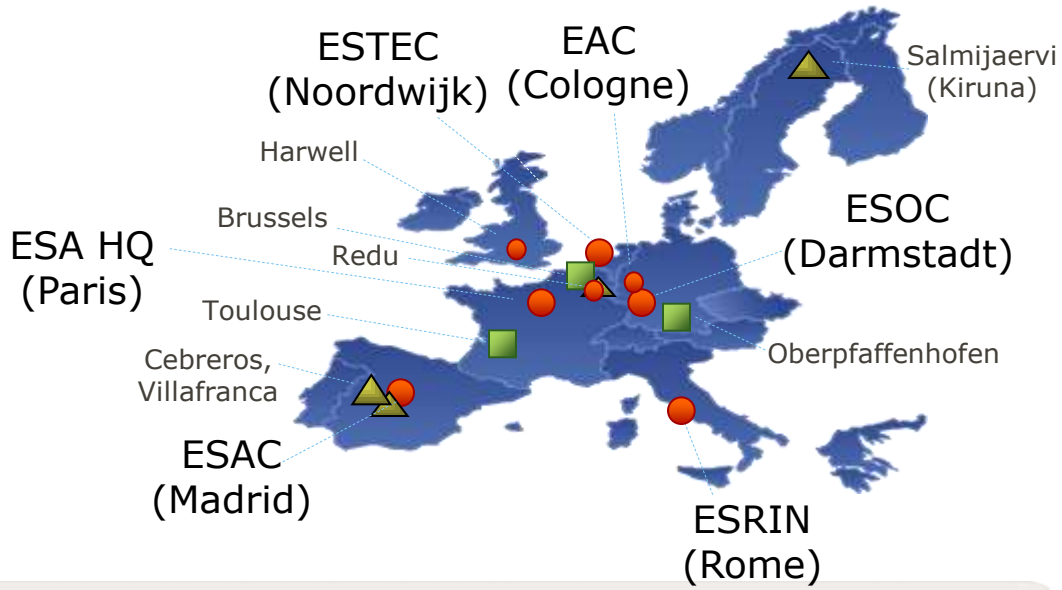
Canada takes part in some programmes under a Cooperation Agreement.

# ESA'S LOCATIONS

ESA sites/facilities

Offices

ESA ground stations

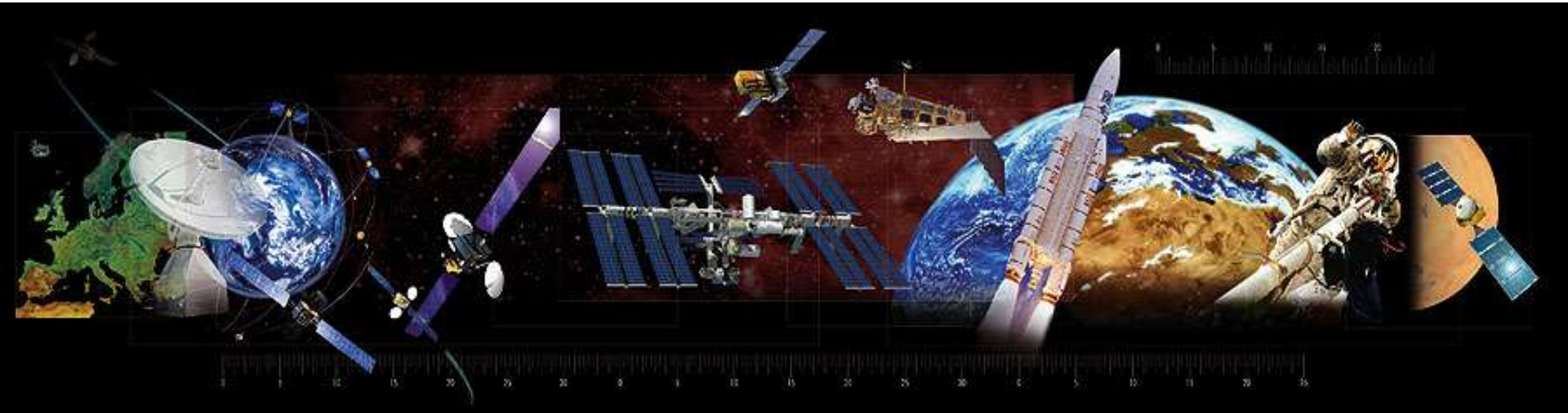


# ACTIVITIES

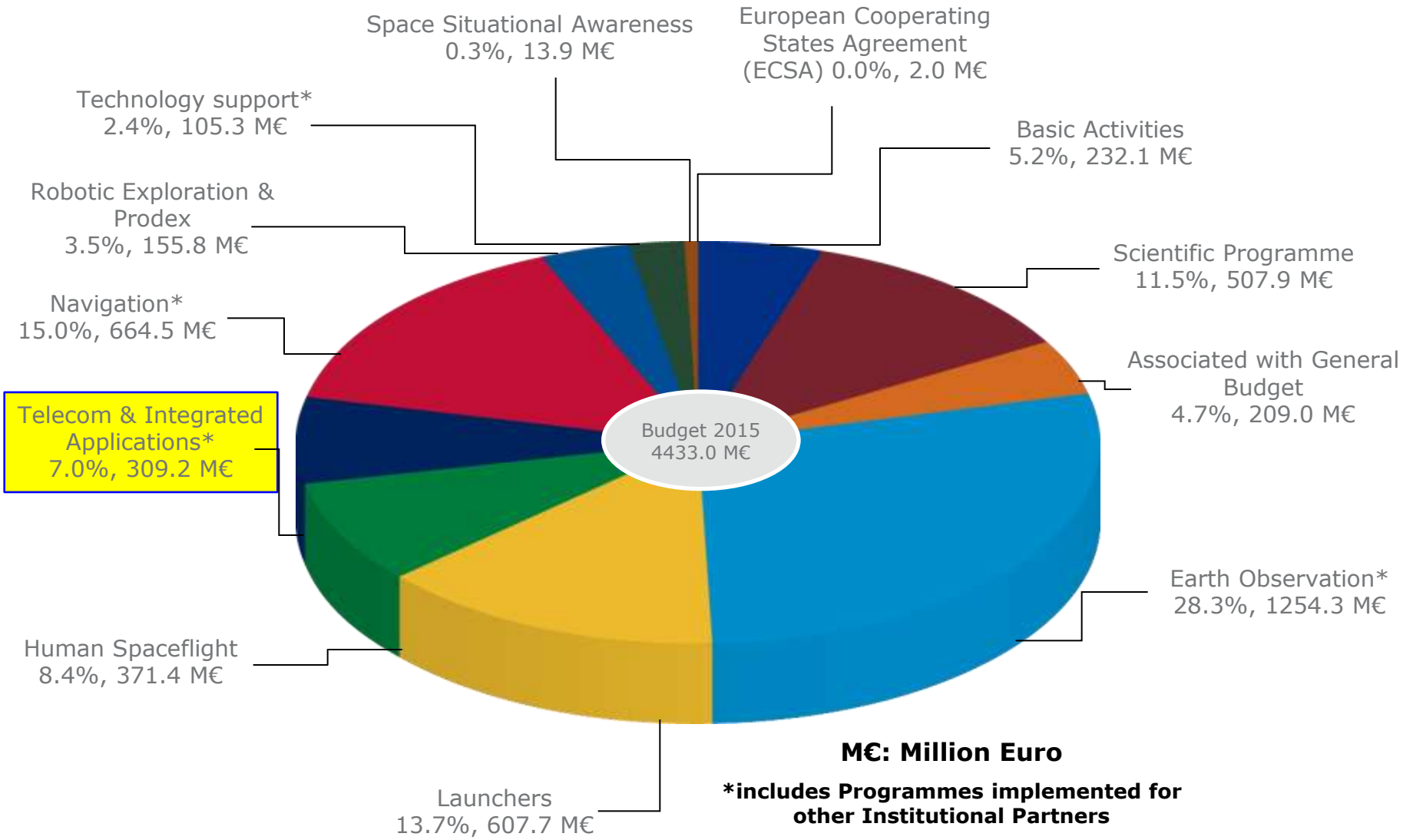
ESA is one of the few space agencies in the world to combine responsibility in nearly all areas of space activity.

1. **Space science**
2. **Human spaceflight**
3. **Exploration**
4. **Earth observation**
5. **Launchers**

- **Navigation**
- **Telecommunications & Integrated Applications**
- **Technology**
- **Operations**



# ESA 2015 BUDGET BY DOMAIN




**M€: Million Euro**

***includes Programmes implemented for other Institutional Partners**

# TELECOMMUNICATIONS & INTEGRATED APPLICATIONS

# The ARTES programme as of today

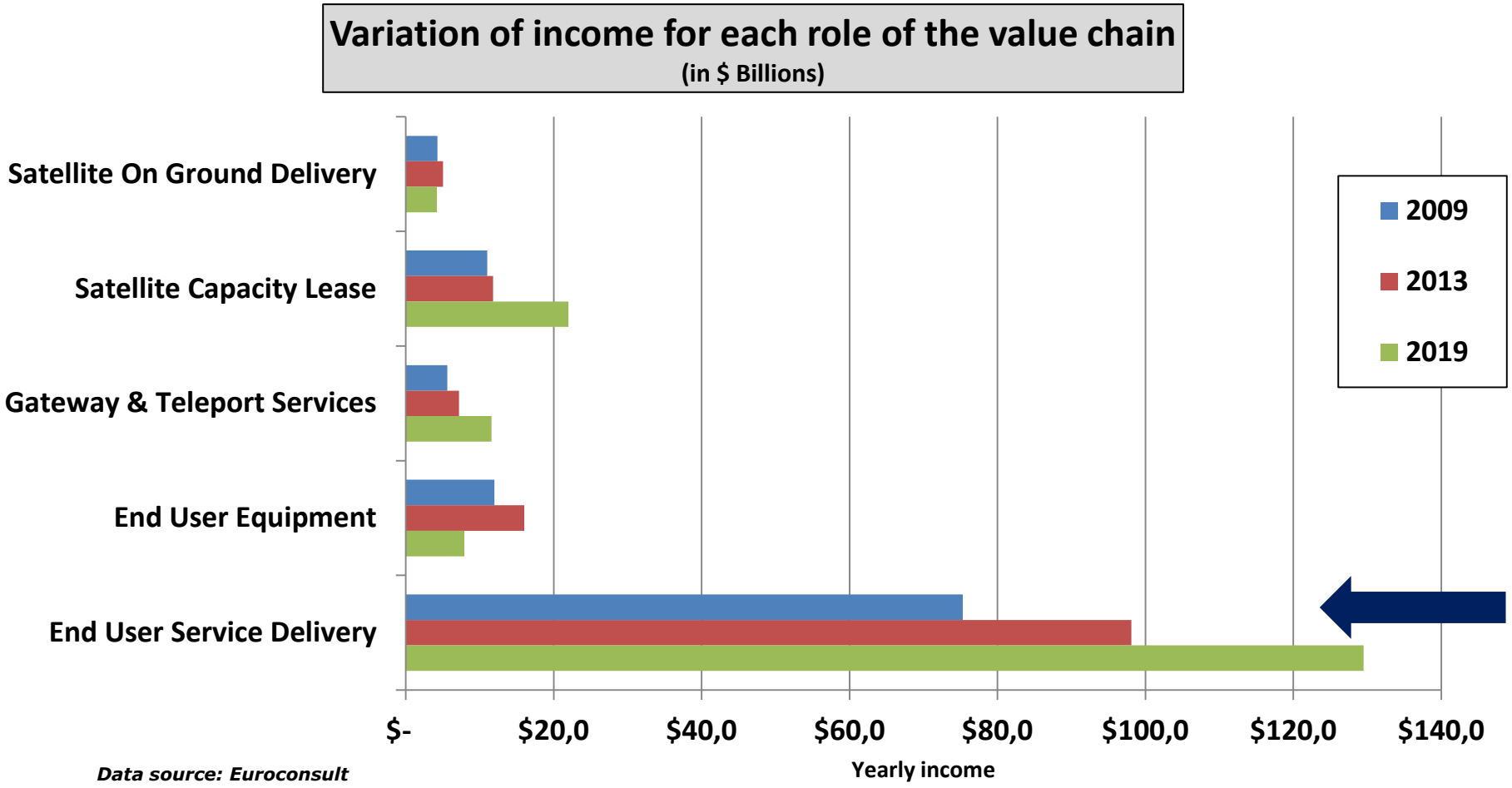
A balanced combination of generic envelope programme Elements

- ARTES 1: Preparatory
- ARTES 3-4: Satcom Space and Ground Segment Products and Satcom Applications
- ARTES 5: Technology
- ARTES 20: Integrated Applications Promotion

and specific Mission/System orientated Programme Elements

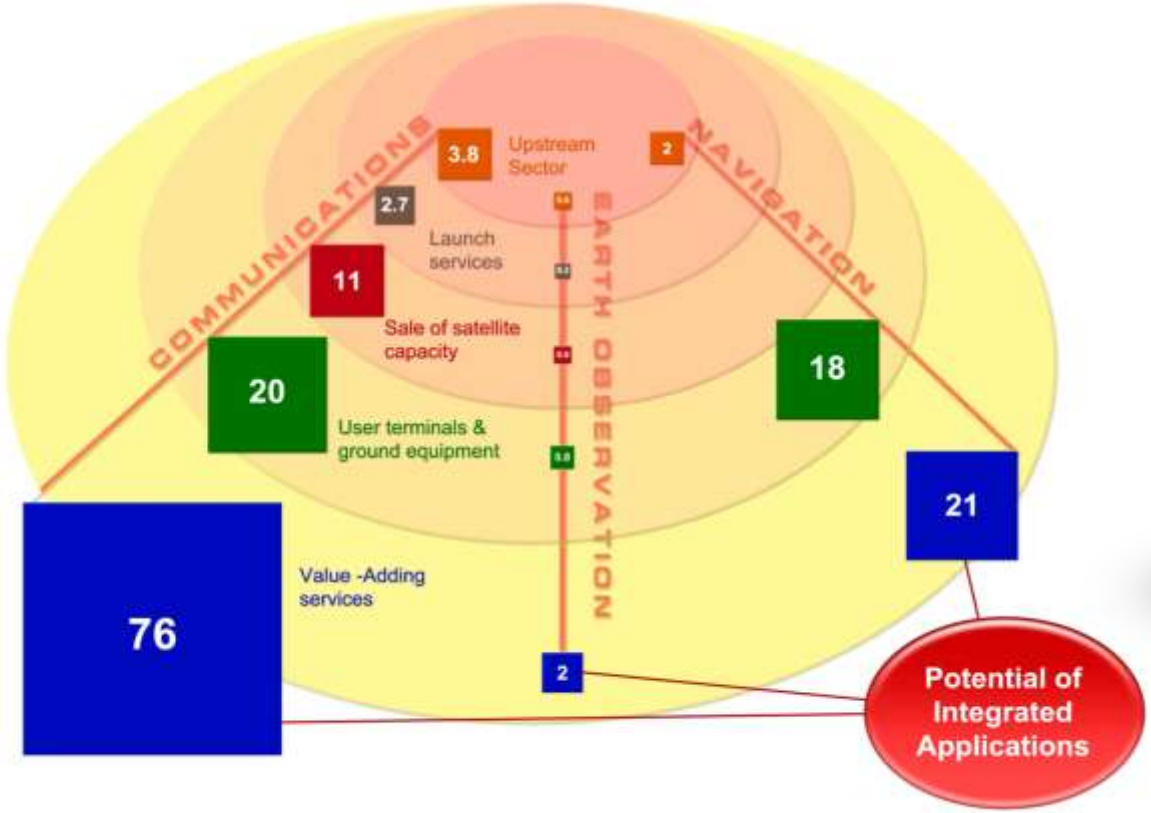
- ARTES 7: EDRS – European Data Relay Satellite System
- (ARTES 8: Alphabus/Alphasat – Large Platform Mission)
- ARTES 10: Iris – Satcom for Air Traffic Management
- ARTES 11: Small GEO platform/mission
- ARTES 14: NEOSAT – Next Generation Platform
- ARTES 21: Sat-AIS – Satellite Automatic Identification System
- ARTES 33: Industry initiated Public Private Partnerships

# 2009-2019: Revenues shifting downstream in the value chain




***Data source: Euroconsult***

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

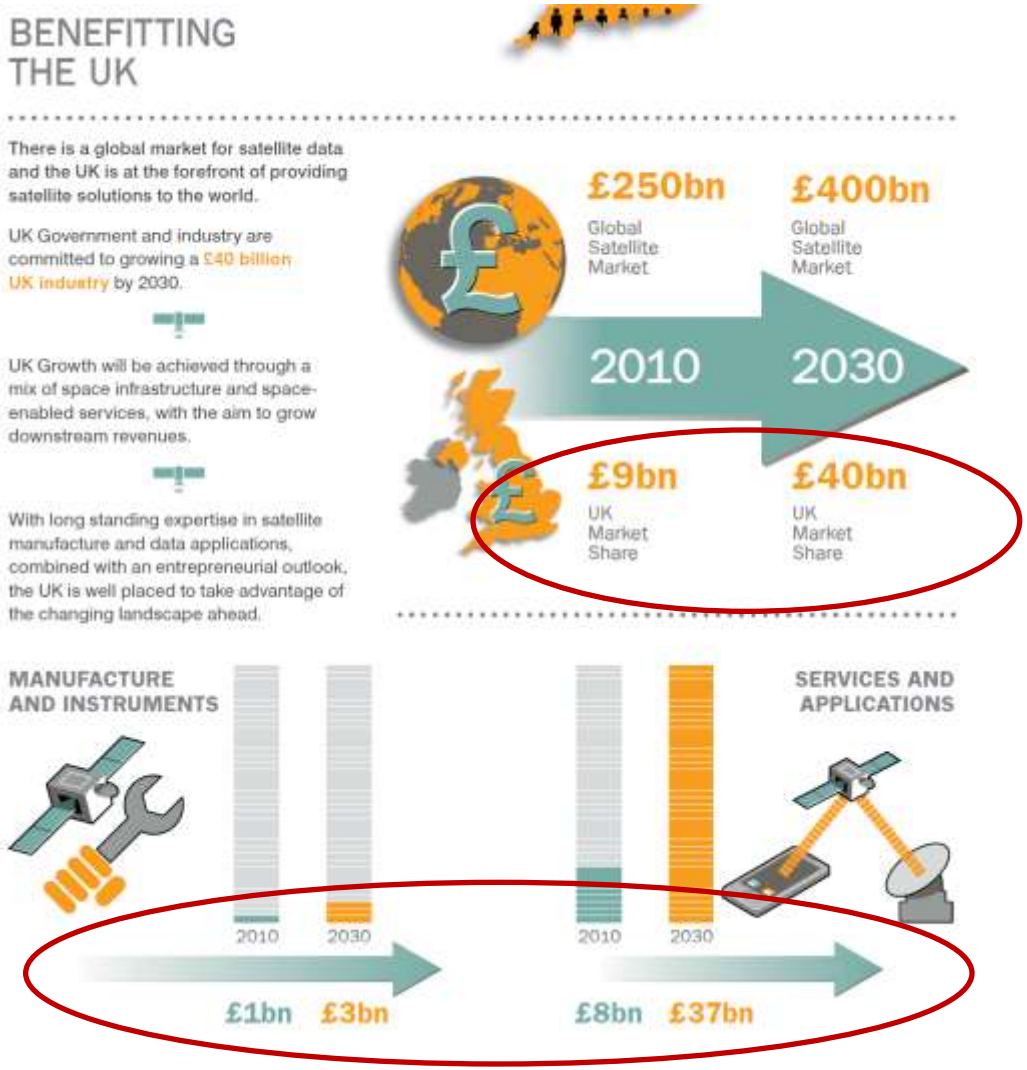


+ HSF

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, 2009/10

# Downstream Applications: Engine for new businesses




**UK**: has concluded that space based Downstream Applications are the engine for new businesses and economy and has increased the investments in this growth market:

- **substantial contribution to IAP**
- **creation of competence centre in Harwell (ECSAT / Space Applications Catapult)**

creating favourable conditions for projects and company foundation

Extract of 2014 UK Information brochure „Satellites for Everyone"

# ARTES Applications Programme Elements providing a steady stream of opportunities

**ARTES 20**
**Integrated Applications Promotion (IAP)**
*(Multiple Integrated Space Assets SatCom, SatNav, Sat-AIS, SatEO, HSF)*

**ARTES 3-4**
**Satcom Applications**
*(Capacity Building, Distance Learning, B2B/B2C, Telemedicine, etc.)*

Development

Water

Energy

Transport

**ARTES applications**
≈300 projects

Agriculture & Forestry

Tourism

Health

Maritime

Security

Media & Broadcasting

**ARTES Satellite Missions:**
**SAT-AIS, Alphasat, EDRS, etc.**
*(Applications & Services)*

**3rd Party Funding:**
**EIB, EC, EDA, EMSA, ERA, SERAPHIM**

# ARTES Applications - Strategic Partnerships

EMSA
FRONTEX
efca

Maritime Activities

EUROPEAN DEFENCE AGENCY
EUROCONTROL

RPAS Activities

LUX DEV

eHealth for Sub-Saharan Africa

European Railway Agency

Space for Rail

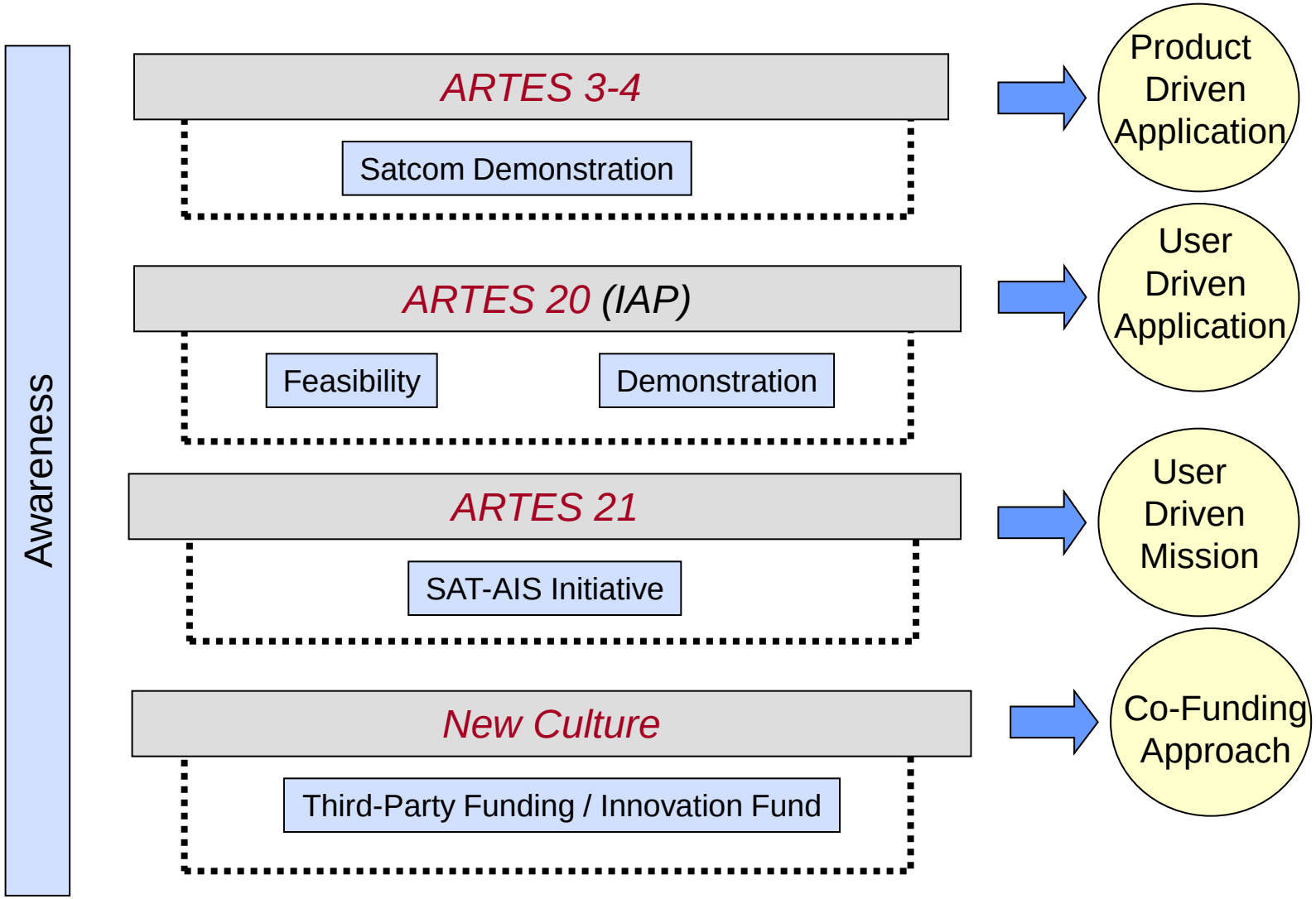
European Investment Bank

"SMAP Fund"

Space for Mediterranean Acceleration Programme

or Official Use

# ARTES Applications & User Driven Missions



# ESA's Telecom Products Programme (ARTES 3-4)

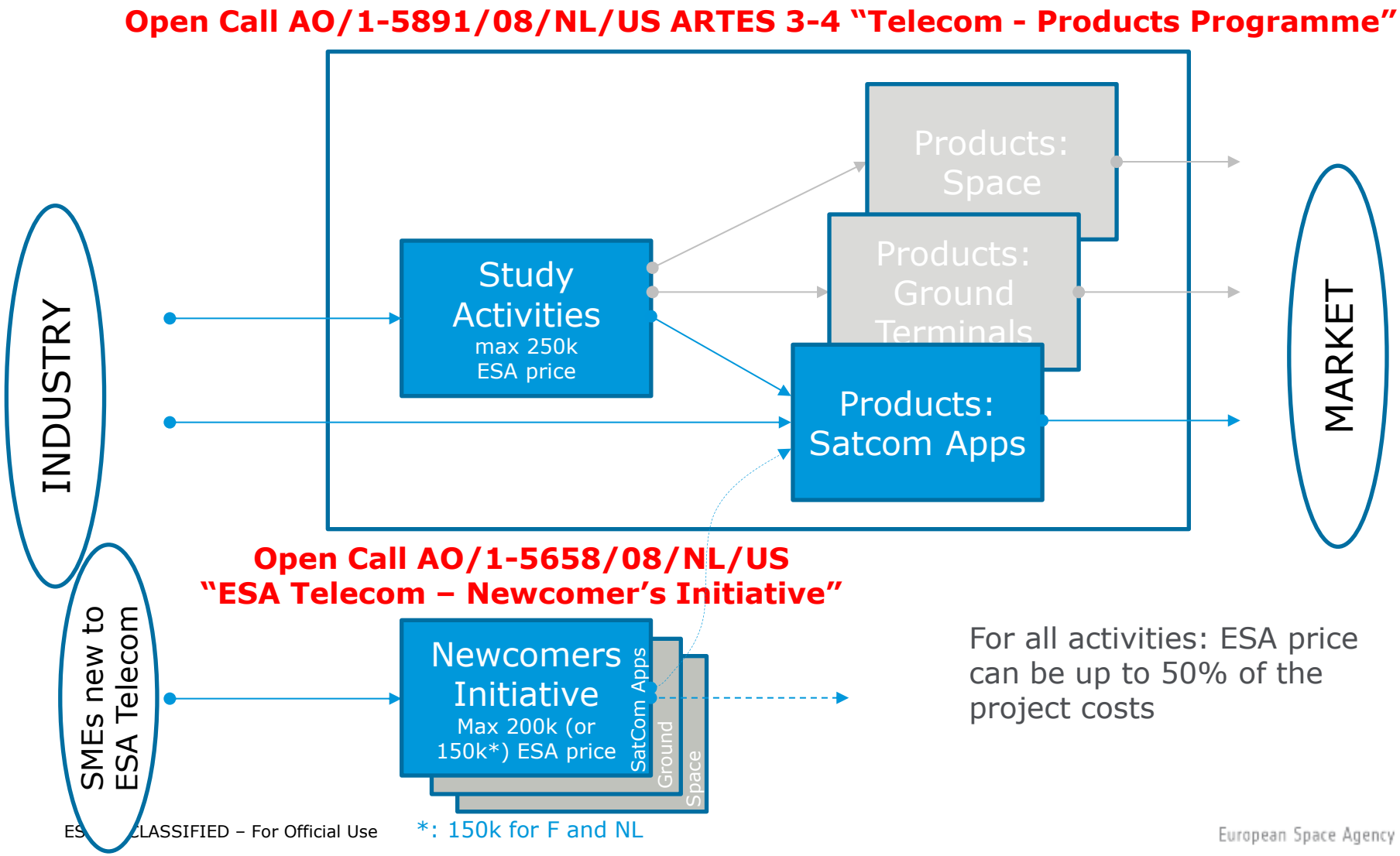
## The goal :

**Maintain and improve the capability and competitiveness of European industry in the world satellite telecommunication market.**

**Ensure the short-term readiness of the industry to respond to commercial opportunities by focusing the ARTES 3- 4 activities on products ready for the commercial or institutional market.**

**Incubator of Products**

# ARTES 3-4 – Commercial Satcom Applications




For all activities: ESA price can be up to 50% of the project costs

*: 150k for F and NL

# ARTES 3-4 – Commercial Satcom Applications AO 5891 – Study Activity

1. **Objective:** perform preparatory work and establish key documents for the development of a product / application for SatCom
2. Tenderer shall have firm plans to develop the application in an ARTES 3-4 Development Activity following the Study Activity. The follow-on activity shall be planned to develop the Satcom Application to the level that it is ready for commercial exploitation
3. **Scope:** consolidate the technical requirements and baseline and identify technical risks before entering into the development of a product
4. **ESA funding:** not exceeding 50% of the cost (max 250 kEuro)
5. Outline proposal optional (but highly recommended!)
6. Info on how to apply can be found in the documentation of the 'Continuous Open Call for ARTES 3-4 Proposals in EMITS **http://emits.esa.int** (AO 5891) and on the website **https://artes-apps.esa.int**
7. **Letter of Authorisation from National Delegation**

# ARTES 3-4 – Commercial Satcom Applications AO 5891 – Product Development

1. **Objective:** Development, integration and pilot utilisation of **Satcom based applications**
2. Ideas originated by Industry (industry driven)
3. Technical part and commercial part / business case equally important
4. **Process:** Outline Proposal ⇒ Full Proposal
5. **ESA funding:** Direct negotiation, funded up to 50%
6. Info on how to apply can be found in the documentation of the 'Continuous Open Call for ARTES 3-4 Proposals in EMITS **http://emits.esa.int** (AO 5891) and on the website **https://artes-apps.esa.int**
7. **Letter of authorisation from National Delegations**

# ARTES 3-4 – Commercial Satcom Applications AO 5658 – Newcomers Initiative

1. **Objective:** attract and assist Small and Medium Enterprises (SMEs) with special attention to companies which never had a contract with ESA Telecom
2. Development, integration and pilot utilisation of **Satcom based applications**
3. Ideas originated by Industry (industry driven)
4. **First step:** Outline Proposal of about 4 pages (business opportunity, role of Satcom, proposed solution, project content, company background, cost/ price, duration, contact information, SME status) via a secure website **http://telecom.esa.int/newcomers**
5. **Second step:** Full Proposal according to Continuous Open Call AO 5658
6. Direct negotiation, funded up to 50% (max. 200 kEuro)
7. **Letter of authorisation from National Delegations**
8. **Difference to ARTES 3-4 (AO 5891):** easy entry, reduced application requirements, more support/training from ESA, business case as part of the project, funding ceiling of 200 kEuro

# ESA's Integrated Applications Promotion Programme (ARTES 20)

## The goal :

**In close partnership with end-users,**

**foster new utilization of existing space capabilities,**

**through the development of integrated applications**

**projects (different space and non space technologies)**

**which demonstrate a potential for sustainable services.**

**Addressing global challenges in different thematic areas:**

**Space for: Health, Security, Safety, Transport, Energy,**

**Environment, Agriculture, Insurance, …**

**Incubator of Services**

# ESA's Integrated Applications Promotion Programme (ARTES 20)

## The goal :

**market pull** In **close partnership with end-users,**

**operational, available** tion of **existing space capabilities,**

through the development of integrated applications projects (different space and non space technologies)

**business development** a potential for **sustainable services.**

Addressing global challenges in different thematic areas:

Space for: Health, Security, Safety, Transport, Energy, Environment, Agriculture, Insurance, …

**Incubator of Services**

# ESA's Integrated Applications Promotion Programme (ARTES 20)

## IAP …

- starts not from **technology push**

  … but from **market demand**

- is not about **technology development**

  … but **business development**

- is not the **customer** of the studies and projets,

  … but **enabler, advisor, consultant**

- is **honest broker** between user demand and industry offering

# ESA's Integrated Applications Promotion Programme (ARTES 20)

## Earth Observation

- Optical: Geoeye, Landsat, Spot, Sentinel
- Radar: Radarsat, Terrasar-X, Cosmo Skymed, Sentinel
- Meteo

## Tele-communication

- Narrowband: Inmarsat, Iridium, Globalstar
- Broadband: SES Astra, Inmarsat, Avanti, Eutelsat, Intelsat, etc.
-

## Navigation

GPS, GLONASS Galileo, Beidou, Zenith, etc

**➔ Developing new services for new user communities**

## Manned Space Flight

- Biological/medical science
- Physical science
- Experimental Platform
- Processes, procedures

## Sat-AIS

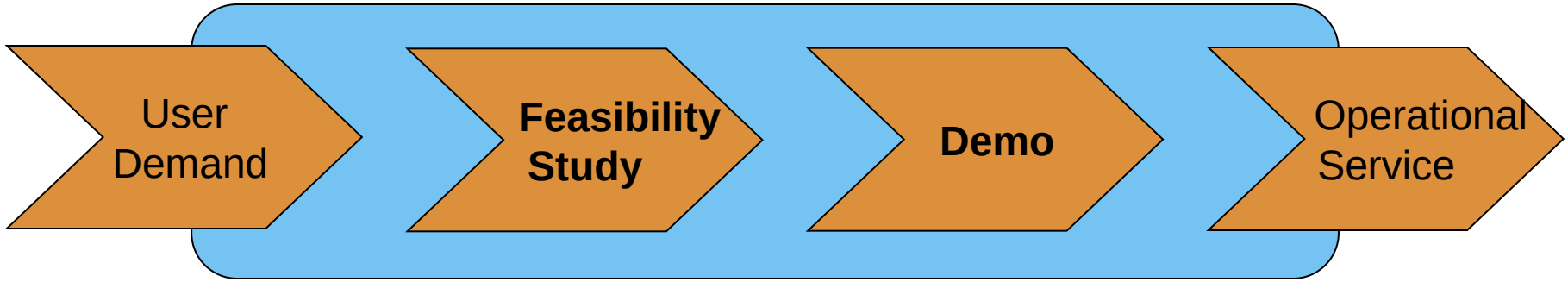
ExactEarth, Orbcomm, Kongsberg, SpaceQuest, etc.

## Other technologies

e.g. algorithms:
- Anomaly detection
- Data ompression

# ESA's Integrated Applications Promotion Programme (ARTES 20)

## ESA IAP Involvement




User with demand but no contact to industry

Contact with ESA:

- iap.esa.int
- conferences
- ambassadors
- call for user ideas

Funding by ESA:

- 100% - ESA initiated activities in close collaboration with users / stake-holders
- 50% * - Partner / industry initiated activities in close collaboration with users / stakeholders

Funding by ESA:

- 50% - initiated by ESA or industry

Support etc.

* For Feasibility Studies only:
Work carried out by universities and research institutes and justifying no further commercial interest in the final solution may be funded 100% by the Agency

# ARTES Applications Ambassador Platform Network

## Tasks of IAP Ambassadors:

- Identification of new application domains which might benefit from integration of space assets
- Creation of awareness within relevant stakeholder communities (e.g. authorities, user communities, service providers, industries, research organisations)
- Linking relevant organisations from users and industries / research organisations
- Linking pin between national organisations – national ESA delegations – ESA/IAP

- Stimulating the submission of ideas and proposals to ESA's ARTES Application programmes ARTES 34 (Satcom) and ARTES 20 (Integrated Applications)
- Scouting of 'raw diamonds' (in Portugal: IPN's 'small ARTES Applications')

# ARTES 20 – Integrated Applications Programme Characteristics

1. **Objective:** Development, integration and pilot utilisation of **Integrated Applications based on several space assets**
2. **User driven activities aiming for sustainable services**
3. **Scope:** Feasibility Studies & Demonstration Projects
4. A) Ideas originated by ESA in collaboration with users
   => Specific Open Competitive Tenders **(ITT)**
   => fully funded
5. B) Ideas originated by Industry in collaboration with users
   => Continuous Open Call for Proposals **(AO 6124)**
   => Outline Proposal ⇒ JCB Approval ⇒ Full Proposal
   => co-funded
6. **Letter of authorisation from National Delegations**

# ESA's Integrated Applications Promotion Programme (ARTES 20)

## Selection criteria for an IAP activity:

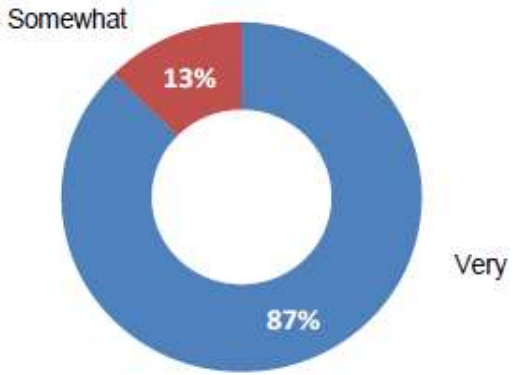
- **Strong user needs, interest & involvement**
- **Utilisation of two or more space assets**
- Evidence of a **clear added value**
- **Potential for sustainability**
- **Strength in background and experience** (credibility) of the bidding team with respect to proposed activity
- **Funding mainly for space** related activities
- And for Demonstration Projects:
  **Need for and the representativeness** of the future service (incl. scalability).

# End User Participation

The participation of end-users in IAP is considered as very important by most of the interviewees for:

- understanding real market needs and requirements e.g. timeframe to launch a service
- helping to define the suitable products and services to meet users' needs
- assessing the service pricing
- building the demo study in order to have a pre-operational service business model
- establishing relations with end-users who will also be potential clients

**Importance of end-users participation**




**Quotations from the interviews**

*...The participation of end-user is critical to understand the real market's need and the necessary timeframe to launch such a service. E.g.: We got feedback from the end-users that we spend too much time to prepare for the launch of an internet portal of the service, the timing did not fit the agricultural cycle. We learned the lesson and improved the service launch timeframe in the second phase of our study….*

*...70% of end-users participants may adopt the product after the end of IAP to become real customer, highlighting the importance of end-use participation in the project. (This percentage is based on the feasibility study results.)*

*…it helps us to define the real user needs as well as to better adopt the technologies to be more suitable for the service deployment ….besides, the participation of end-user can help us to estimate if such an operational service would be profitable….*

*...The participation of end-user becomes the first reference client of the services, which is an important argument to commercialize the services in the future…*

*...The end-users also help us to promote the service in the industry, e.g. Our end-user is an energy company which help them to promote the service in the energy sector.*

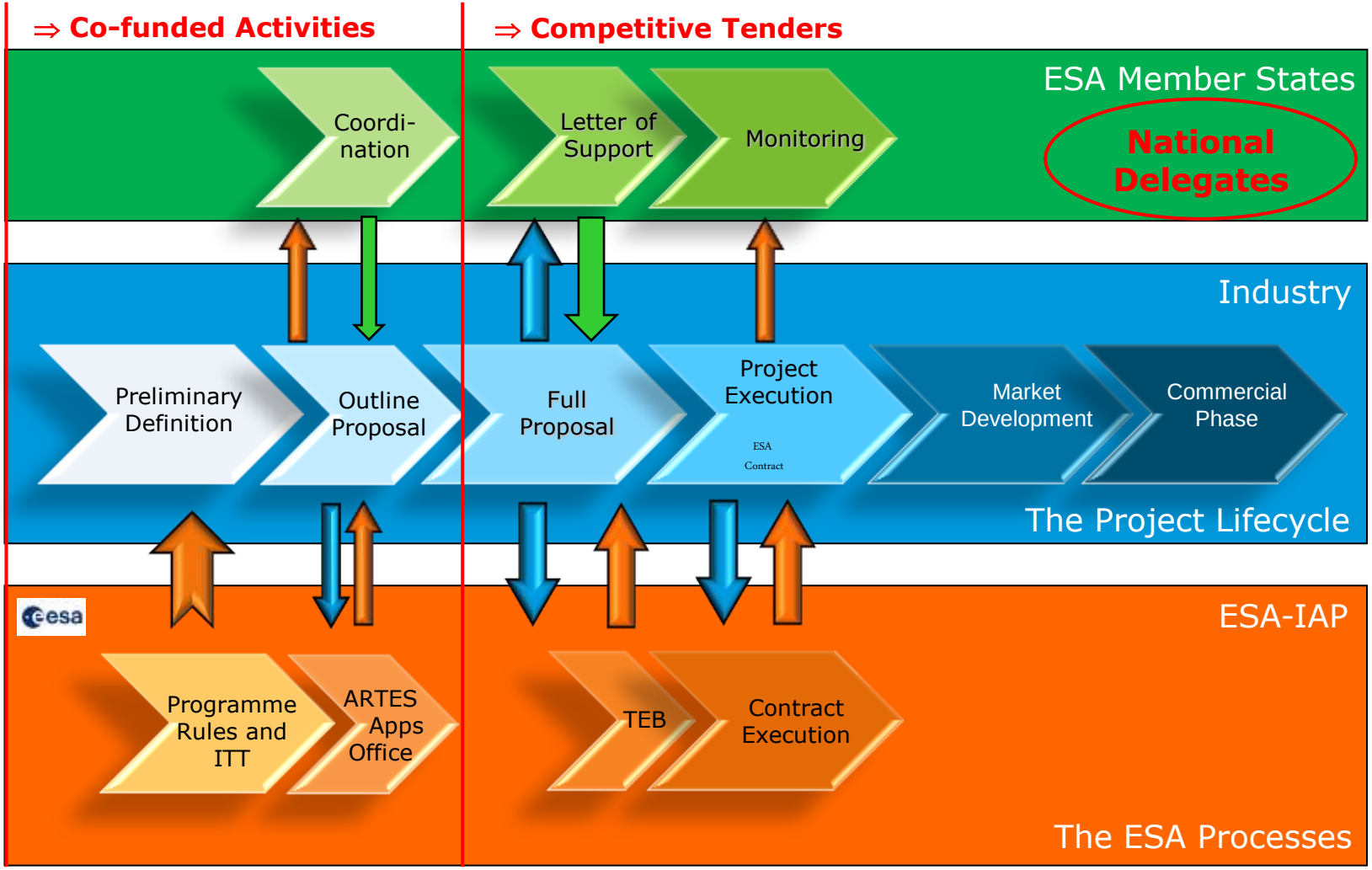
## Ideal characteristics of involved parties:

- **User/customer:**
  - representing / leading broader markets (champion)
  - enabling the market access
  - communicator to spread the message
  - open for new solutions and systems
  - willing to engage as stakeholder / customer / client
- **Service provider:**
  - familiar with the market (already in the market)
  - provider of operational services (24/7)
  - various technologies to address the specific user demand
- **Industrial team:**
  - strong leadership and good management
  - right mix of know-how (completeness of the team)

## Ideal know-how / composition of consortium (depending on the subject):

- Earth Observation value adding services
- GIS & mapping services
- In-situ sensors & data collection
- Satcom products & service provisioning
- GNSS products and service provisioning
- Subject specific expertise
- Data fusion & modelling
- Service provisioning in the subject area
- Commercial expertise

# ARTES Application Programmes
# Project Lifecycle & ESA Processes



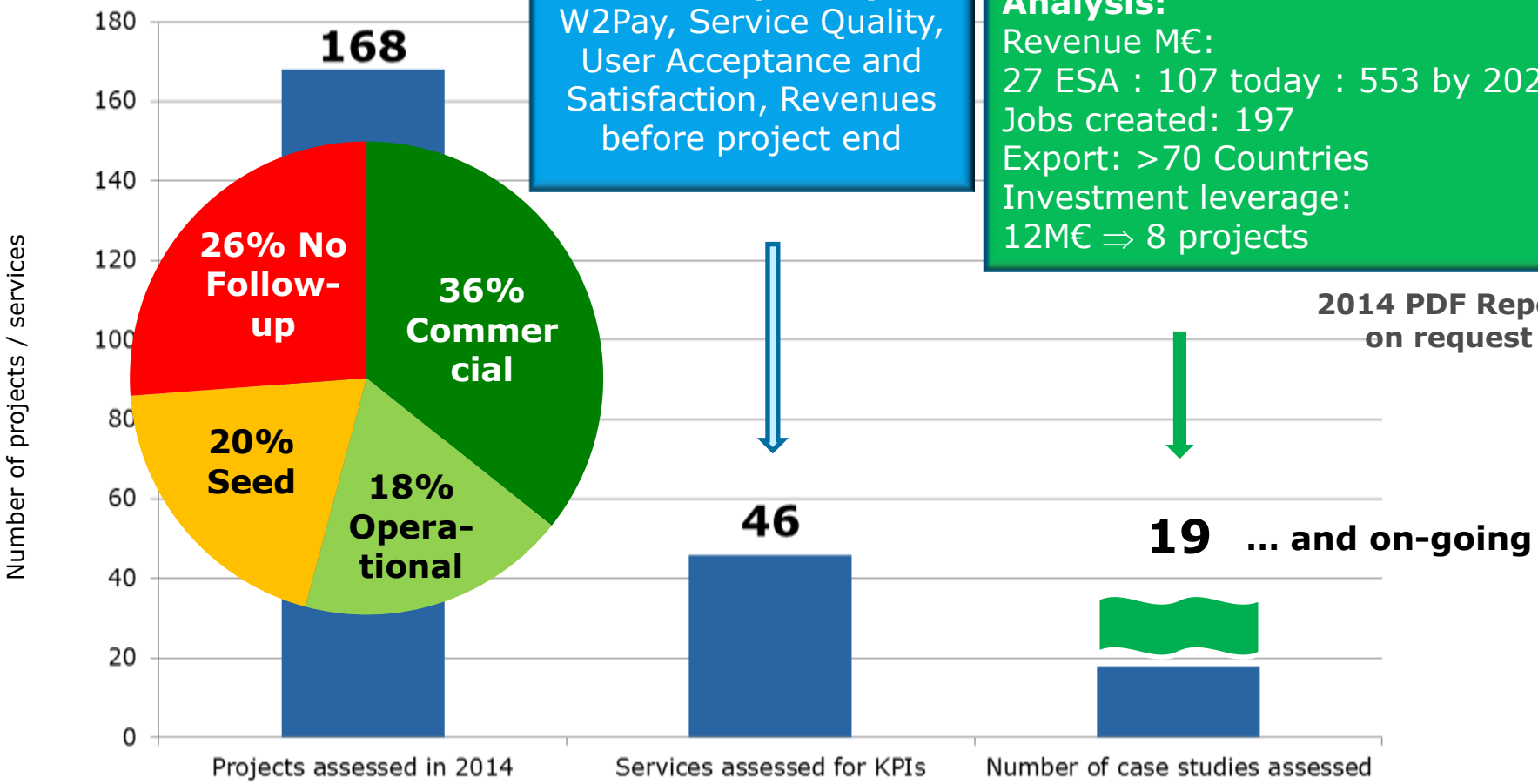

TEB:= Tender Evaluation Board

# Assessment of ARTES Application in 2014

**Profitability Analysis:**
W2Pay, Service Quality, User Acceptance and Satisfaction, Revenues before project end

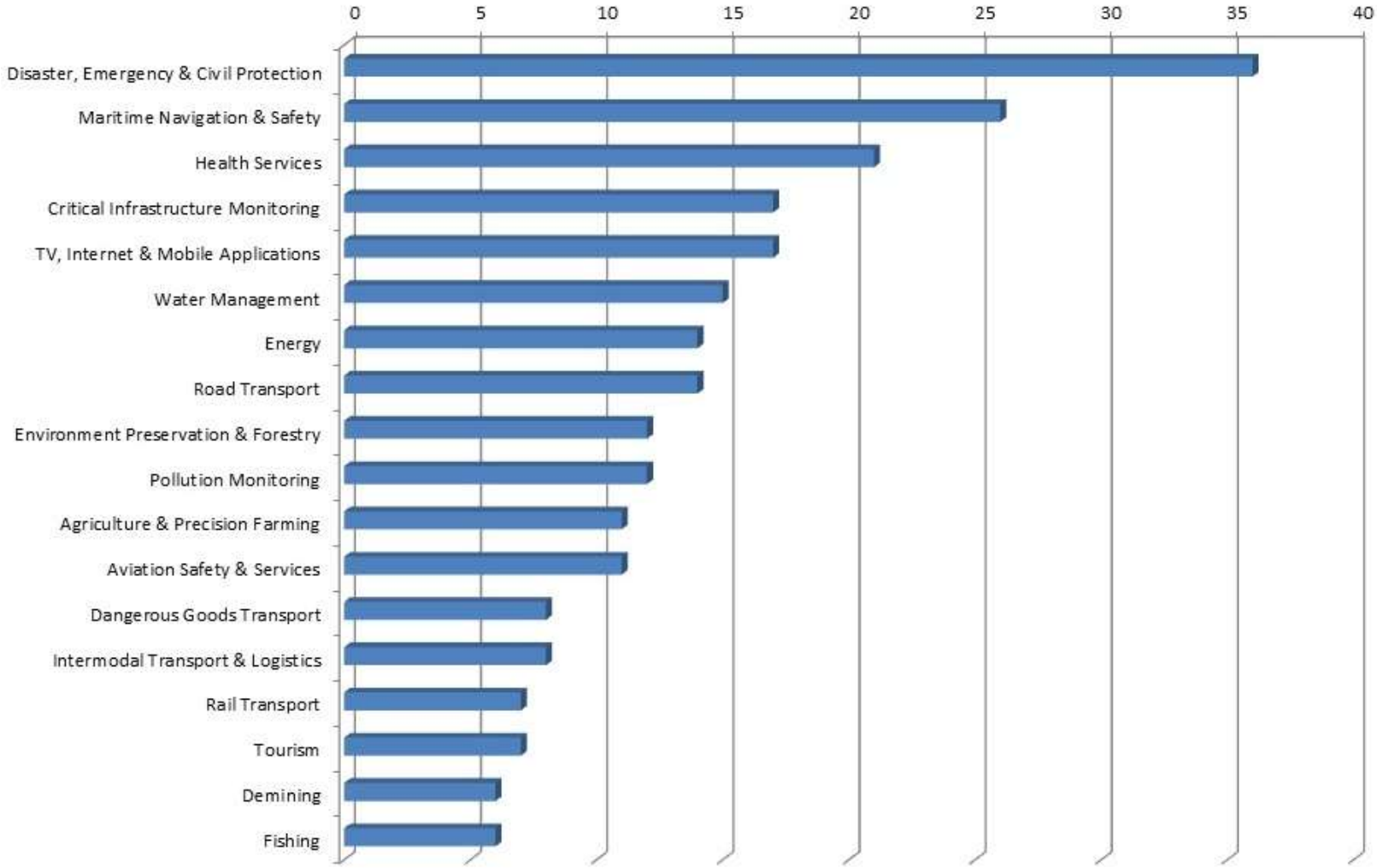
**Socio-Economic Impact Analysis:**
Revenue M€:
27 ESA : 107 today : 553 by 2020
Jobs created: 197
Export: >70 Countries
Investment leverage:
12M€ ⇒ 8 projects

**2014 PDF Report on request**

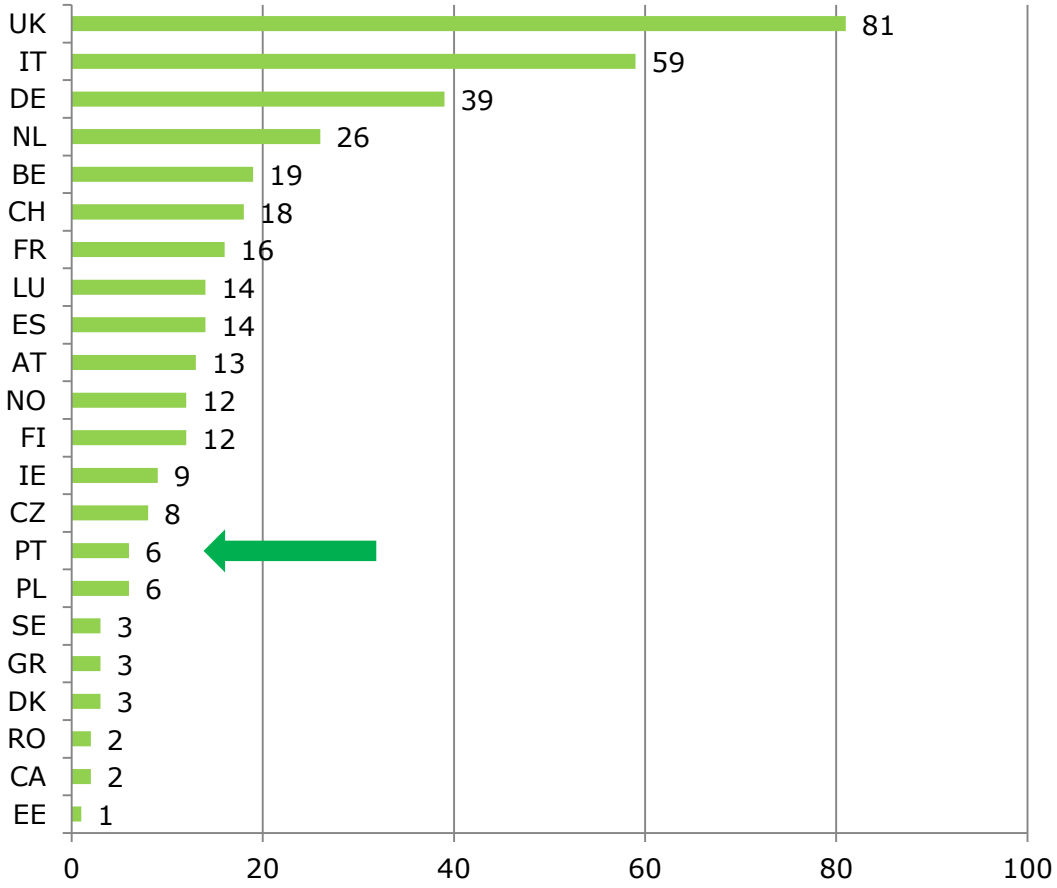



**Success Rate** | **5 KPIs** | **10 Indicators**

# IAP addresses almost every market sector
(Number of discrete activities from 2009-2014)



# Number of companies engaged in the ARTES Applications programmes 2009-2014




- 366 different entities involved as a prime or a sub-contractor.
- from 22 countries.
- >80% of the entities are in the top ten countries, 56% are in the top four.
- 60% of the involved entities are SMEs, many of them are new to ESA

# Assessment of ARTES Application in 2014

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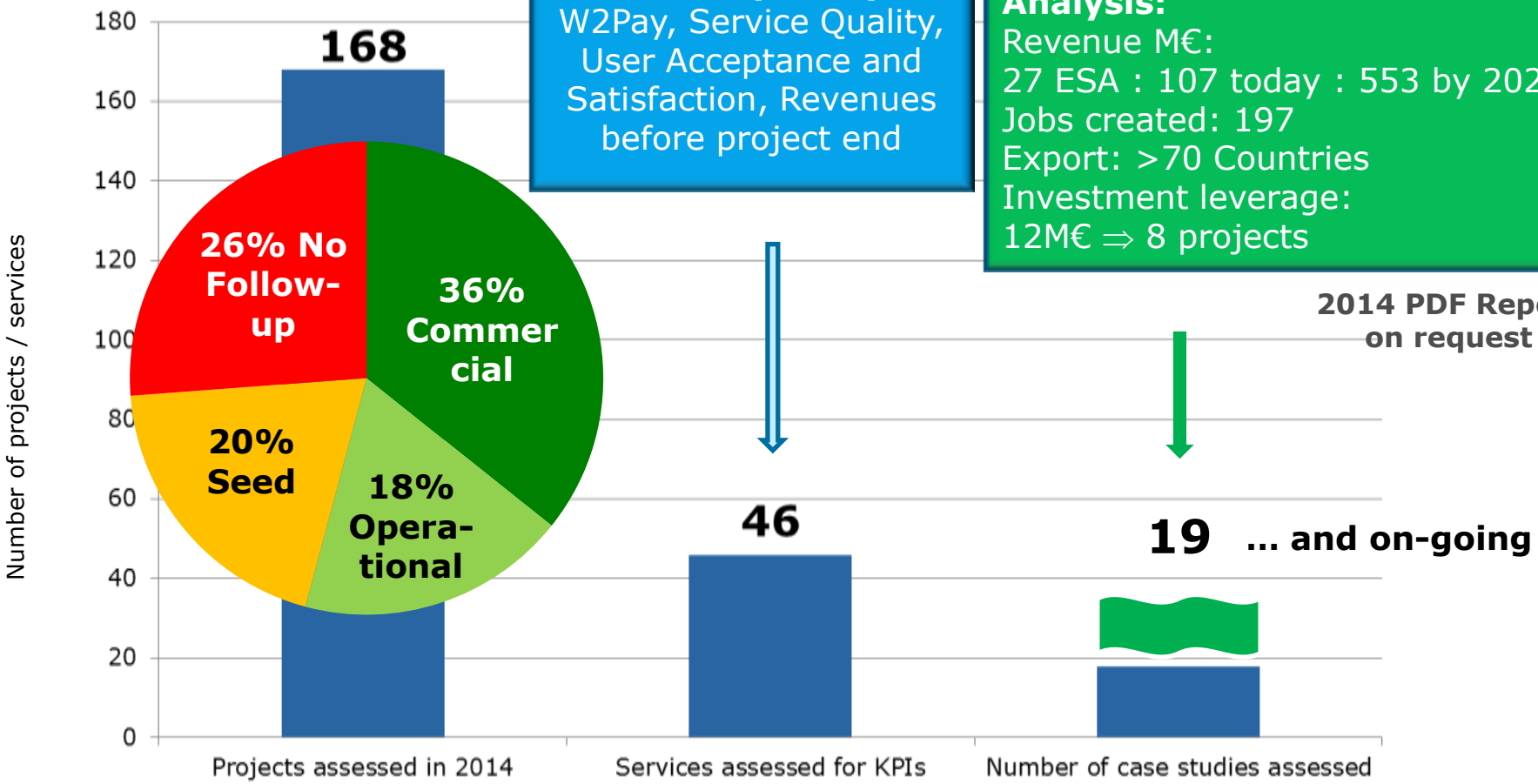
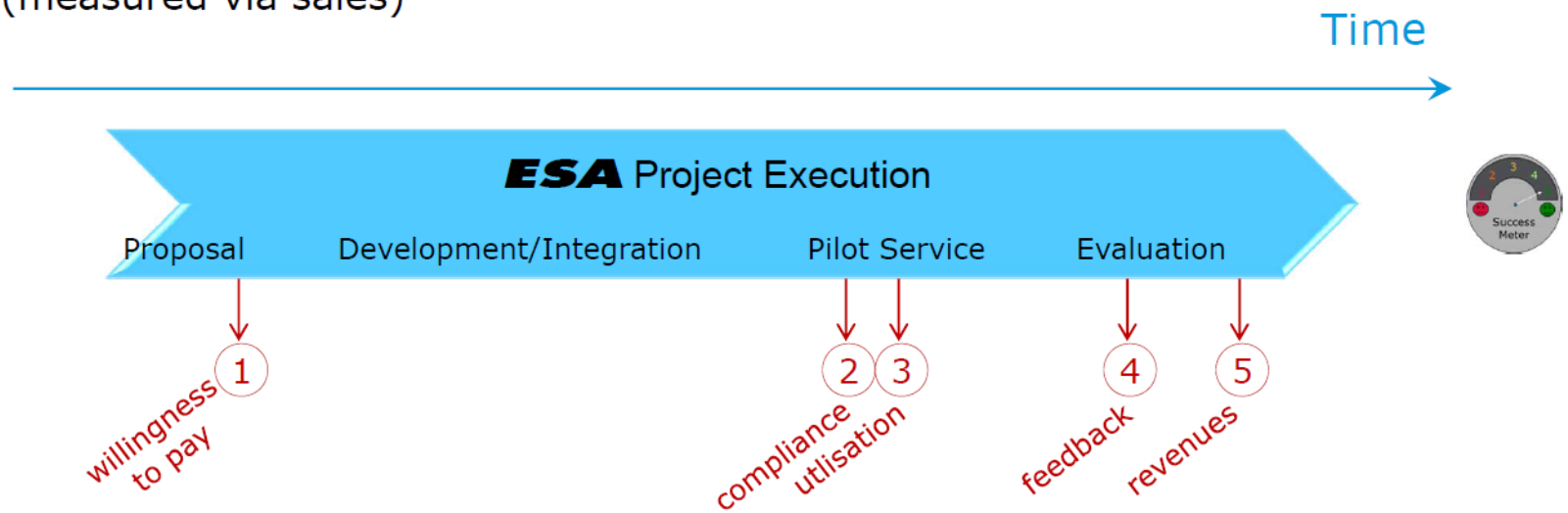



**Success Rate** | **5 KPIs** | **10 Indicators**

# Assessment of ARTES Application in 2014

## 5 Key Performance Indicators: what is measured and when

1. Customer willingness to pay (evidence via formal written statement in the proposal)
2. Product/Service quality: technical aspect of the product/service, working as expected (measured via monitoring of technical status)
3. User acceptance: users were actually using the product/service during the pilot (measured via utilisation profile)
4. Stakeholders confirmed their needs were satisfied during the pilot (measured via feedback)
5. Products/services have generated revenues before end of the pilot stage (measured via sales)



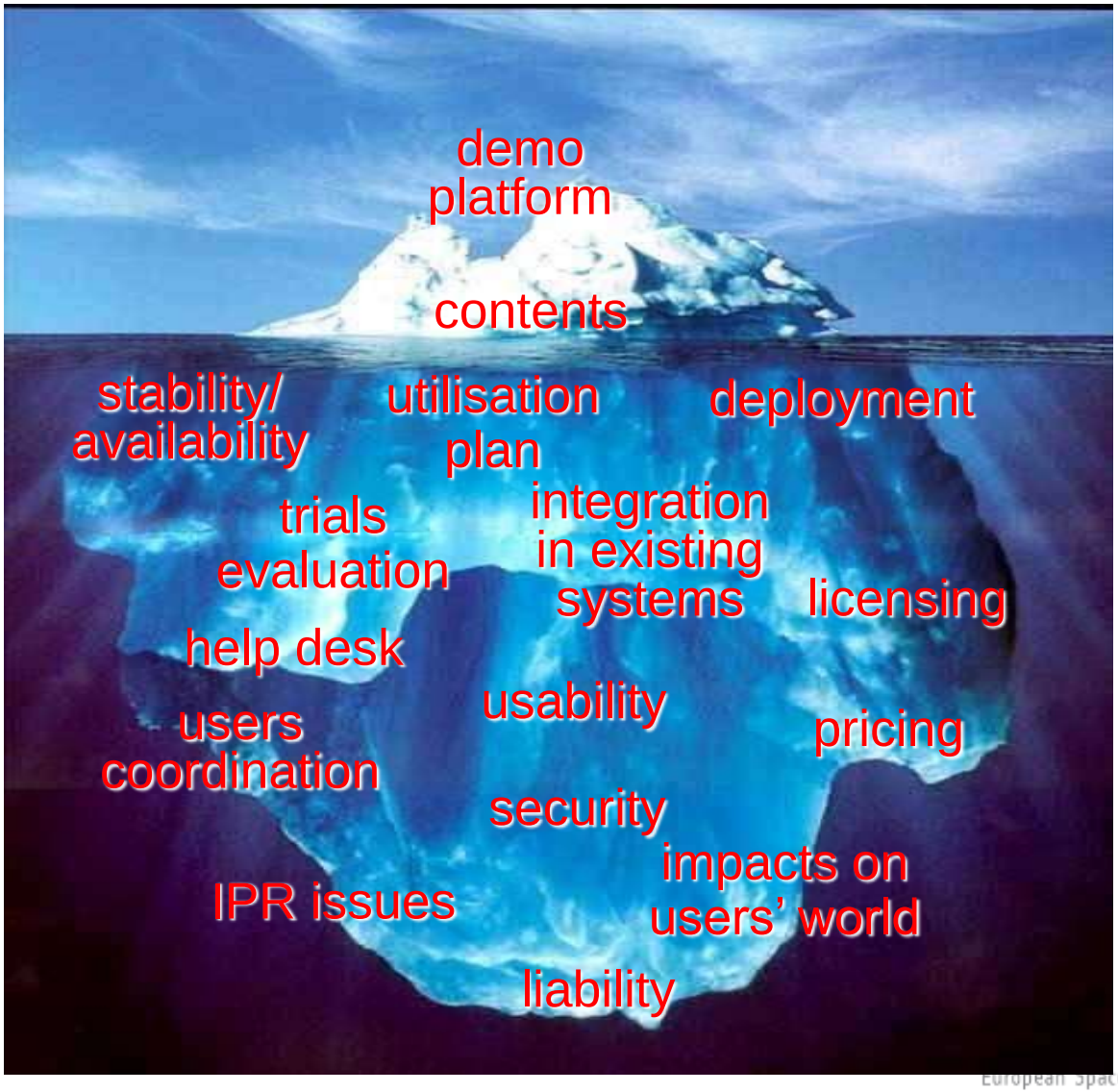
# From Demo Project to Operational Service: What makes the difference

**Feasibility:**

Look, it works!

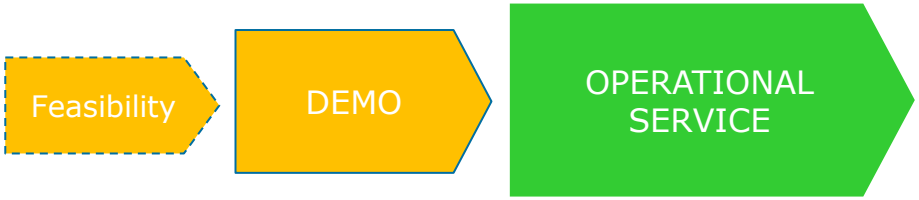
**Sustainability:**

It is an available and reliable 24/7 service



# Socio-Economic Impact Assessment
# 10 key indicators

- Ten (10) socio-economic indicators are assessed for activities and contractors:
  - **Revenue:** where possible also identifying export sales.
  - **Investment leverage:** 3rd party investment (equity, debt, grant, public funds, M&A)
  - **Value creation:** cost benefit to the user
  - **Jobs:** created or sustained as the result of the activity & its outputs
  - **Innovation impacts:** e.g. market disruption, patents…
  - **Addressable markets:** the size of the potential opportunity.
  - **R&D spend uplift:** increase in the ratio of R&D expenditure/revenue
  - **Extent of value chain/export impact:** quantification of value chain (number of business relationships including consortium partners, suppliers and distributors)
  - **Quantifiable social benefits:** reduction in mortality, improved infrastructure resilience, etc.



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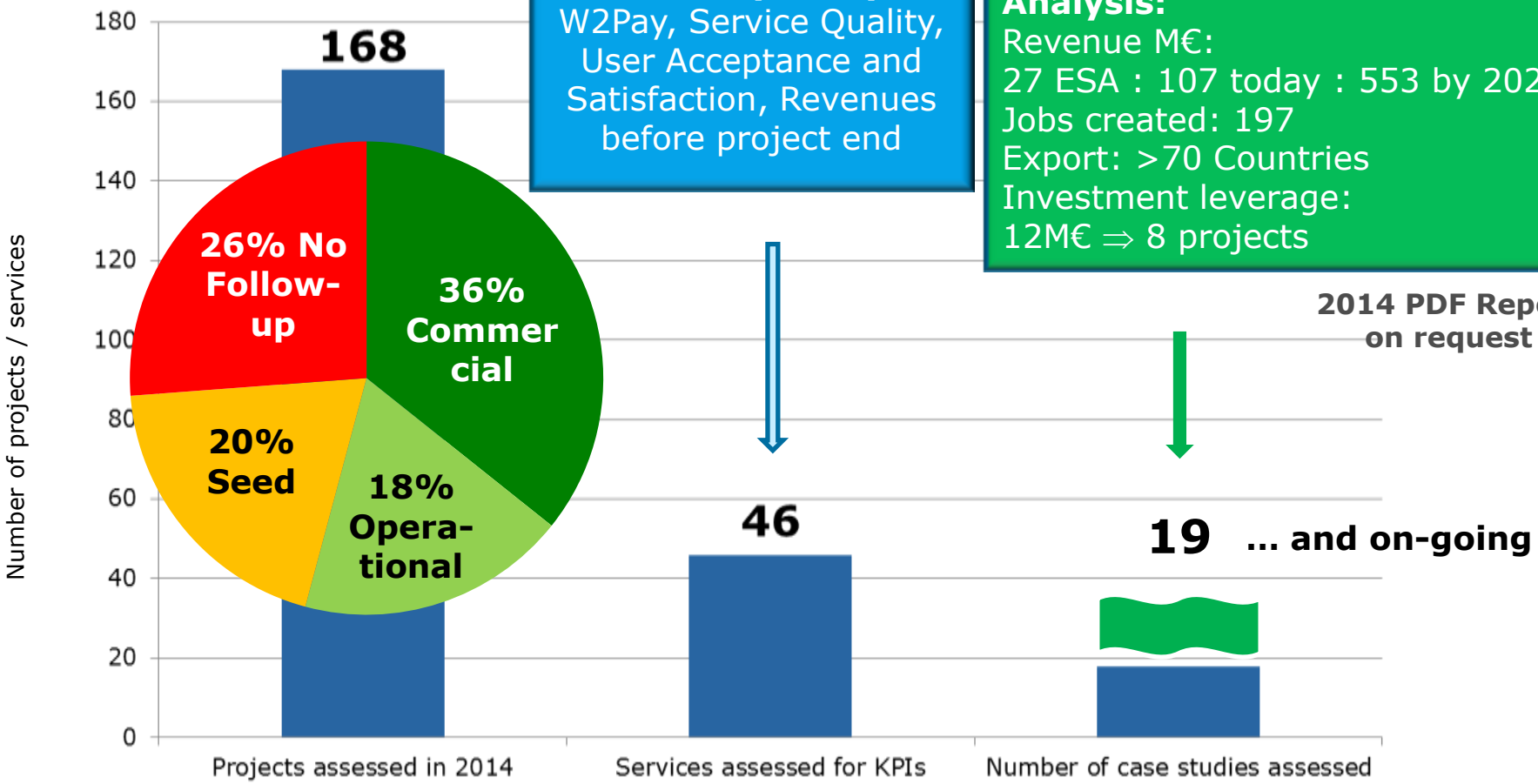
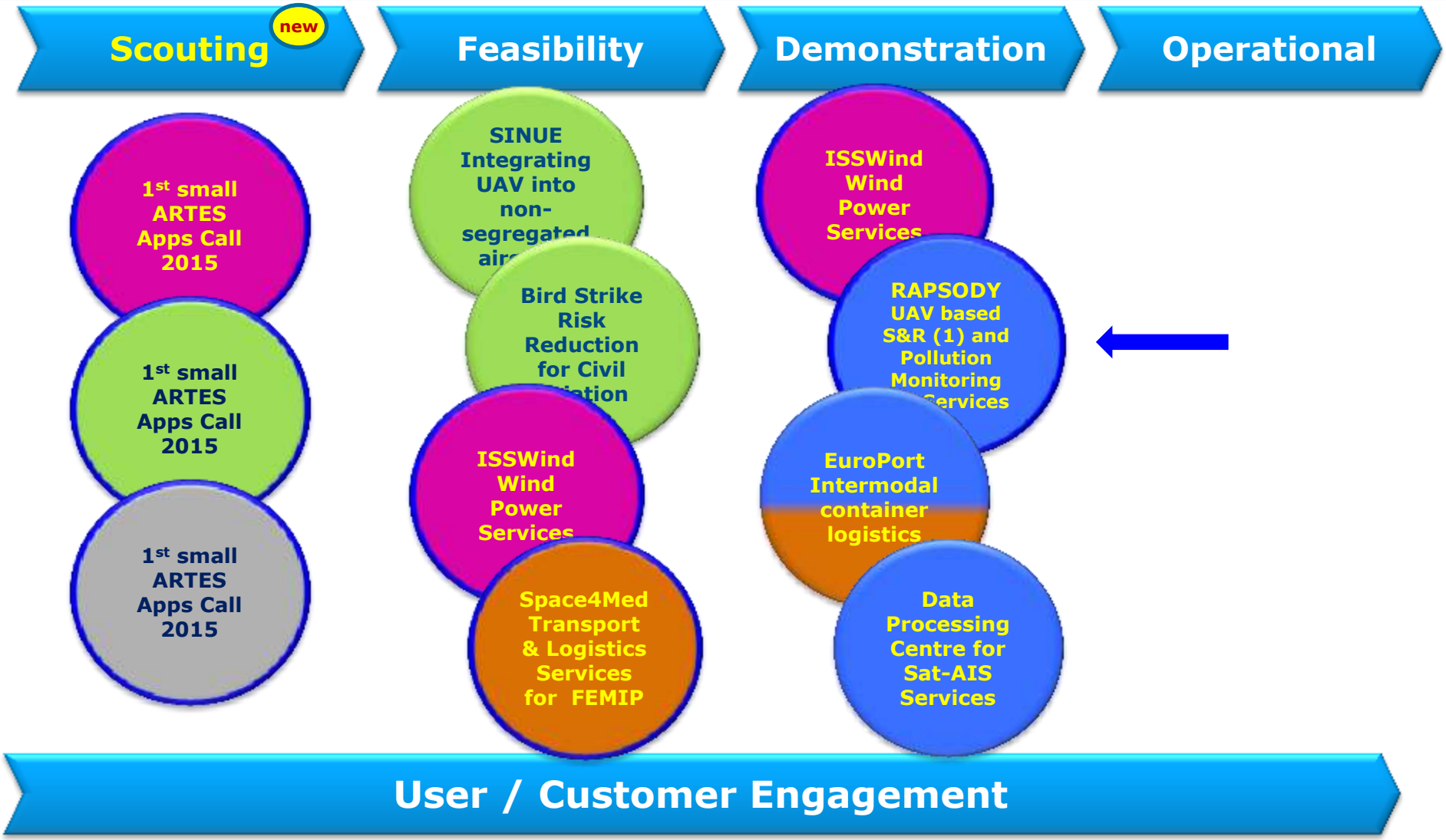



**Success Rate** | **5 KPIs** | **10 Indicators**

# Involvement of Portuguese companies in ARTES Applications since 2009






Energy Road Maritime Aviation Network Security

# RPAS (Remotely Piloted Aircraft Systems): IAP activities in key sectors

## Maritime Surveillance

*LUMEN*

*DeSIRE*

*DeSIRE2*

*RAPSODY*

## Energy

*SURMON*

*ARII*

## Demining

*SAFEDEM*

**RPAS range: Micro to MALE RPAS**

**Space assets: Satcom, SatNav integration with SatEO data**

## Agriculture

*KORE*

*BIOSCOPE*

*PalmOil*

## Emergency response

*B-LIFE*

## Transport

*Unmanned postal delivery*

# RPAS (Remotely Piloted Aircraft Systems): RPAS requirements

**Emergency response**
**Demining**

Safedem- <2 kg

KORE – 2.5 kg

**Agriculture**

**Transport**

**Maritime Surveillance**

DeSIRE- 1250 kg

RAPSODY – 150 Kg

LUMEN – 40 kg

SURMON – 35 kg

**Energy**

Flying BLOS – Satcom equipped

Micro-RPAS

150 kg
Light RPAS

MTOW
MALE

# ESA offers …

- **Financial support** in the co-funded programmes ARTES 20 (Integrated Applications Promotion) and ARTES 34 (Satcom Applications)
- **Consultancy** from idea generation until introduction of a sustainable application / service
- **Access to ESA's technological expertise** in a number of disciplines covering not only space
- **Networking within and access to** the community of the ESA Telecom and Integrated Applications programs (regular workshops on various subjects), i.e. a plethora of organisations and industries
- Organisation of **awareness activities** on specific subjects (thematic workshops, PR campaigns, etc.)
- **Credibility** through the involvement with ESA as international acknowledged organisation

# Participant Feedback on IAP Elements

## Most appreciated in IAP

- The **integration of different technologies:** the wide range of opportunities for the application of well-established satellite technologies and support with the challenge of defining new applications

- **Cooperation with end-users**: their involvement in the projects

- Opportunity for SMEs to develop sustainable tools and services: IAP helps a company to investigate the feasibility of a project, learn procedures and validate a business case

- The users-driven approach and the « market-orientation » of final results: **development of real operational services** is key and the market study at the beginning of the project was very important

- Little investment required to validate some good ideas

- Small consortium of 4-5 companies

- The way ESA works with the participants: team work, workshops; the management instruments and methods made available by ESA; Open Call and not just ITTs

# What are the opportunities offered?

**1. Continuous Open Calls for Proposals:**

**ARTES 3-4: AO 5891 (Satcom Application Studies & Projects)**

**ARTES 3-4: AO 5658 (Satcom Newcomers Initiative)**

**ARTES 20: AO 6124 (Integrated Applications Feasibility Studies & Demo Projects)**

**2. Competitive tenders (ARTES 20 Feasibility Studies):**

**Tender currently in preparation:**

"Space Applications using Animal Tracking Data"
tender expected to be published begin November 2015
(opening period of about 10 weeks)

**3. Initiatives in cooperation with strategic partners:**

e.g. "Space for Med Accelerator Platform" (EIB, KAFD) initiating partnerships with Jordan entrepreneurs to address FEMIP region

**Further information under: https://artes-apps.esa.int**

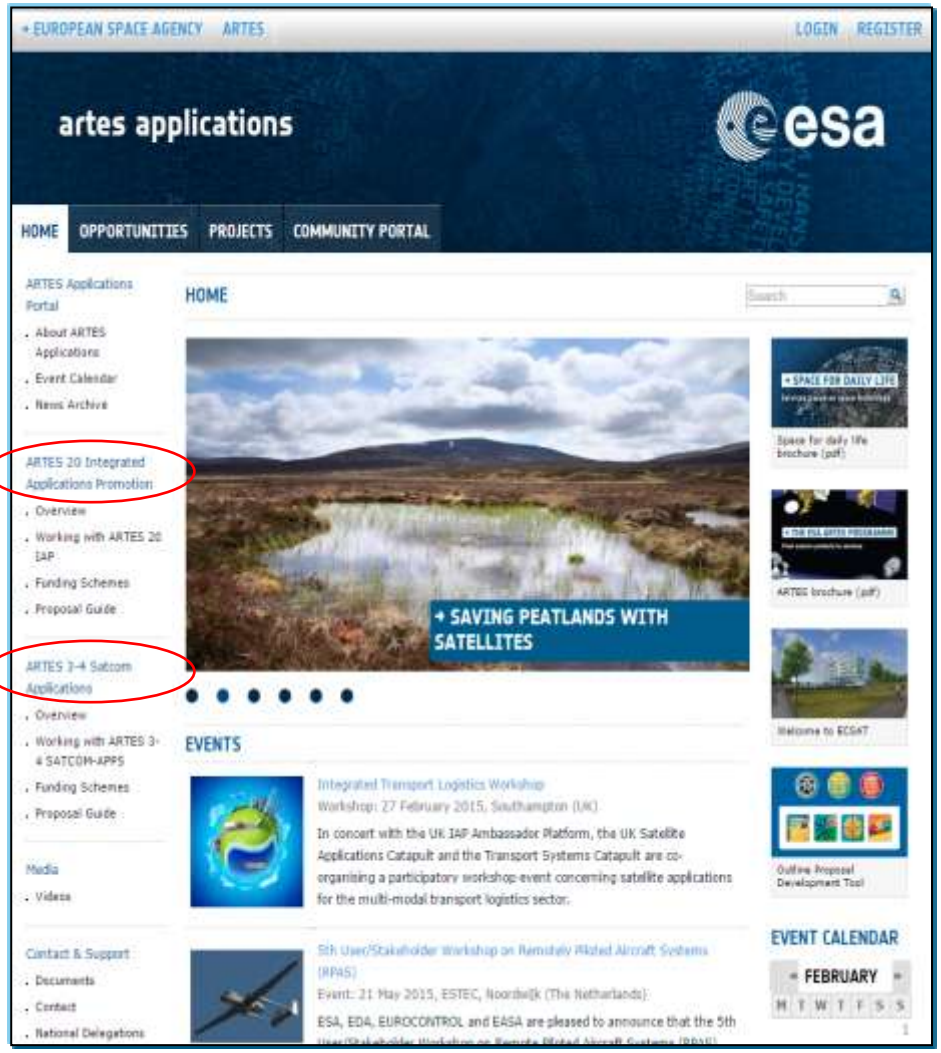
# What are the opportunities of Portugal?

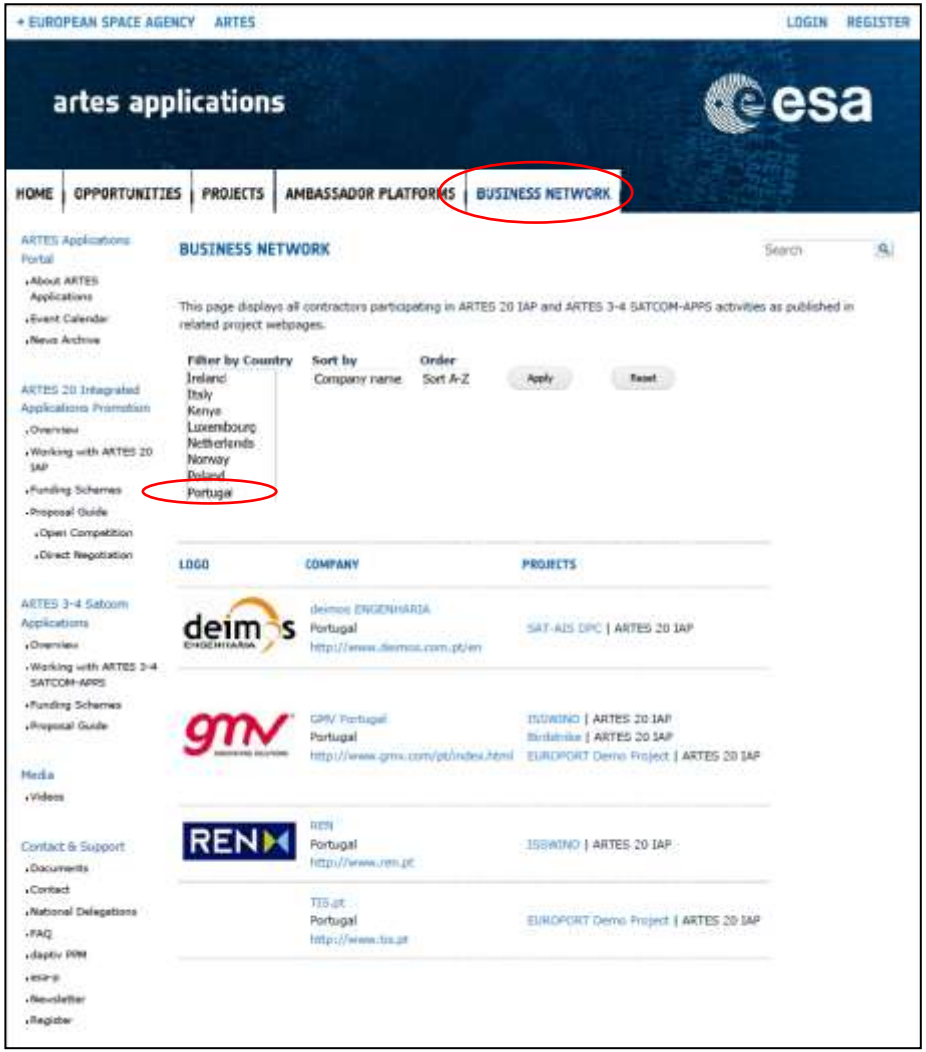
- Stimulating the engagement of SMEs (Small and Medium Enterprises)
- Addressing locations and export markets specific to Portugal such as 'Community of Portuguese Language Countries (CPLP)
- Addressing topics which are considered economically interesting for Portugal, e.g. transport, energy, fishery

**The initiative is with you,**
**ARTES Applications is there to help**

**If you have an idea**
**… come and talk with us**
**… or our & your Ambassador in Portugal**

# ARTES Applications Portal
## https://artes-apps.esa.int



# IAP references

- IAP Website: **http://artes-apps.esa.int**
- IAP Open Call for co-funded activities online on
  - EMITS: **http://emits.esa.int** (AO6124)
- Information on IAP Open Competitive Tenders online on
  - IAP website **http://artes-apps.esa.int/intended-tenders/all**
  - EMITS at the time of publishing **http://emits.esa.int**
- IAP Proposal Guides on
  **http://artes-apps.esa.int/what-and-why/proposal-guide/iap**
- Interactive outline proposal tool for Demo Projects
  **https://artes.esa.int/opdt/artesapps/artes20demo/**
- Project web pages of IAP feasibility studies and demo projects
  **http://artes-apps.esa.int/projects**
- IAP general email address: **iap@esa.int**

# Contact

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