

# **ESA ARTES Applications Programme Overview**

**AP Norway Workshop  
Stavanger 13th April 2016**

Tony Sephton

ESA IAP Special Projects

# ESA Programmes



All Member States participate (on a GNP basis) in activities related to space science and a common set of programmes (Mandatory programmes).

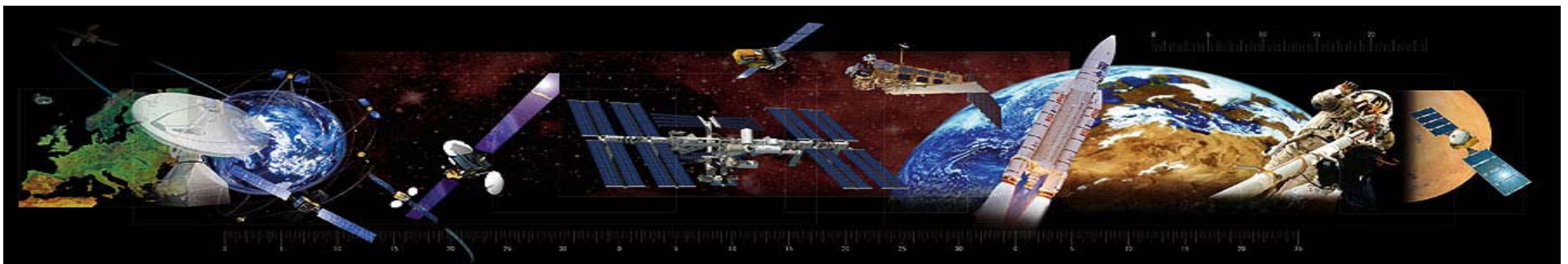
## Mandatory

- General Budget: Future studies, technological research, education, common investments (facilities, laboratories, basic infrastructure)
- Science: Solar System science, astronomy and fundamental physics

In addition, Member States choose their level of participation in Optional programmes.

## Optional

- Human Spaceflight
- **Telecommunications & Integrated Applications**
- Earth Observation
- Launchers
- Navigation
- Robotic Exploration
- Space Situational Awareness



# ARTES 20 – Integrated Applications Promotion (IAP)



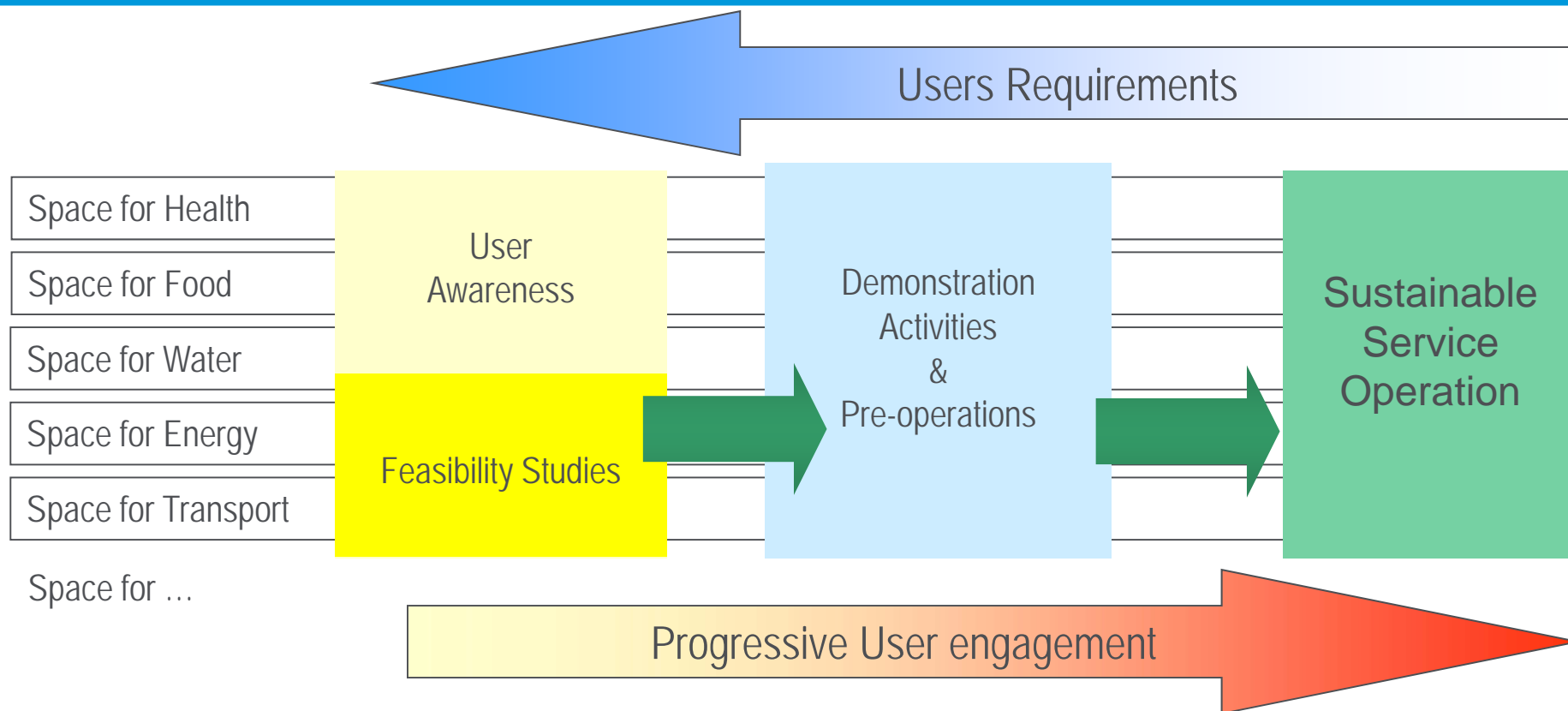
IAP is ESA's User Driven programme to leverage on space investments and develop sustainable services

## Objective:

- Foster utilization of existing space capabilities.
- Avoid research / new technologies.
- Work in close partnership with users/customers.
- Develop integrated and sustainable services.
  - Starts not from **technology push**  
... but from **market demand**
  - Is not about **technology development**  
... but **business development**



# IAP Programme Structure

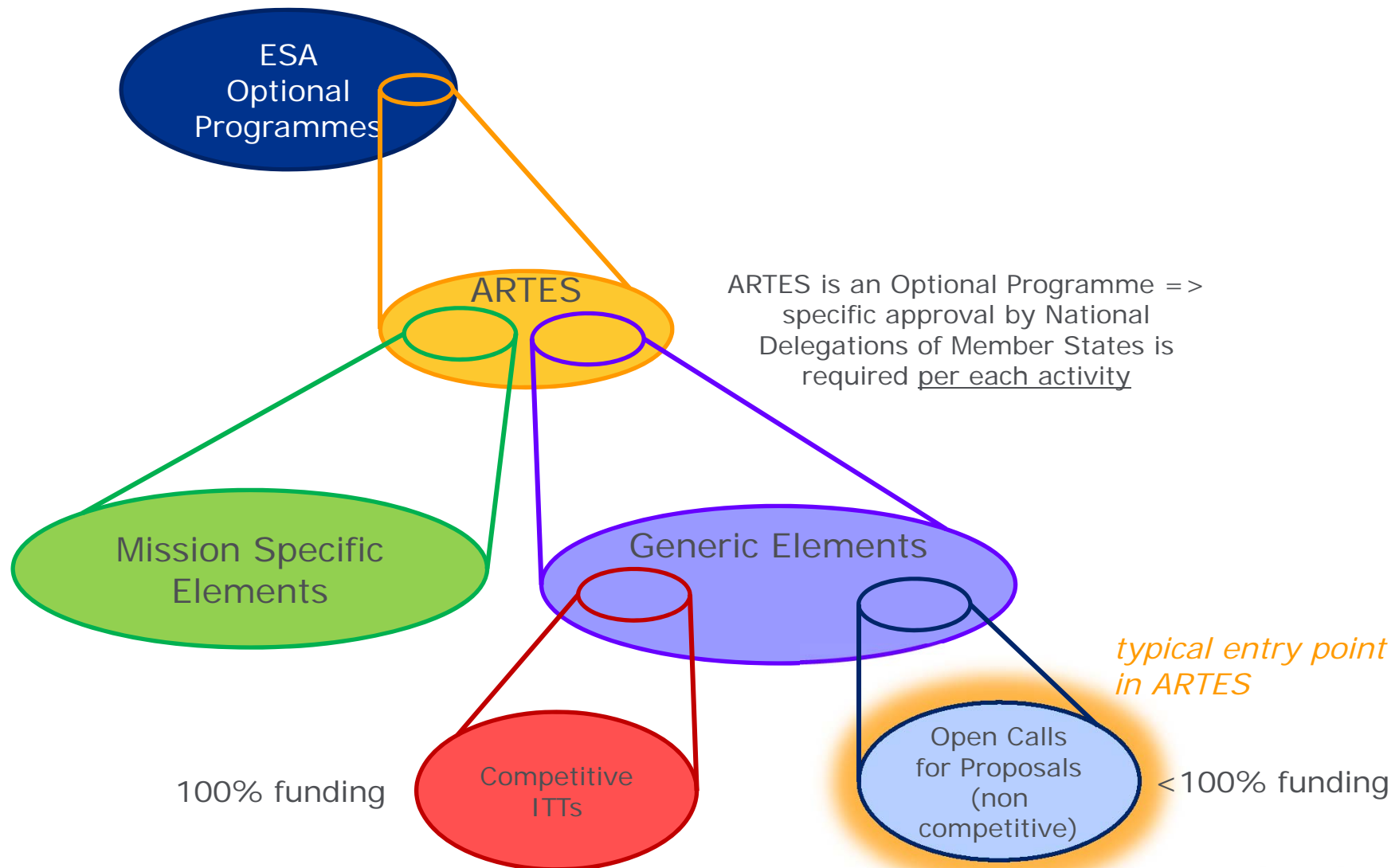


Awareness Activities: Understand, foster and organise stakeholder demands.

Feasibility Studies: Assess technical and economic viability of services.

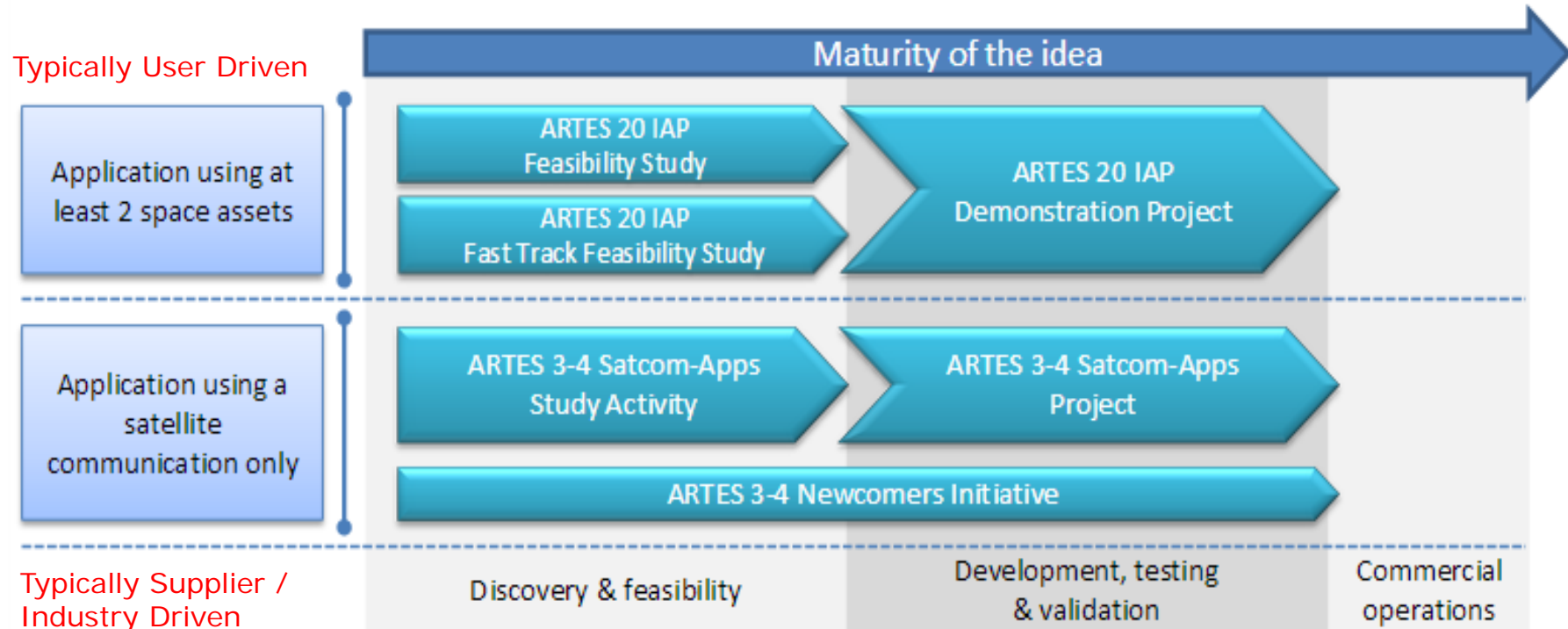
Demonstration Projects: Implement pre-operational services in partnership with users.

# How to Apply to ARTES – Entry Point



# ARTES Applications Funding Modes

<https://artes-apps.esa.int/opportunities>



What ESA provides:

Financial support, technical expertise, business development, ESA branding/recognition, facilitating partnerships, (...)

# When to utilise Space Assets

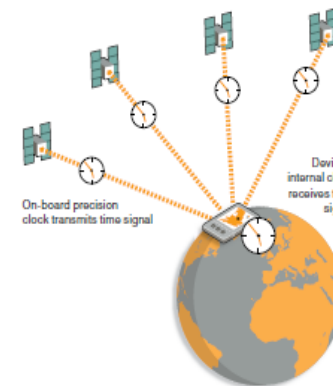


## SatCom:

- Voice, text, imagery, video, M2M, ...
- Connecting remote places without terrestrial communications.
- Transmission of secure information.
- BLOS communication with RPAS.
- Applications requiring large bandwidth (lot of data / information).
- Multicast / broadcast applications.
- Back-up for terrestrial systems.

## SatNav:

- Positioning from GNSS:
  - Correction data such as RTK allows centimetric precision.
- Tracking of individual persons and goods.
- Precise timestamping of events.
- GNSS reflectrometry:
  - Sea state measurements.
  - Wide-swath altimetry.
- SAT-AIS for maritime applications.



# When to utilise Space Assets



## Earth Observation:

- Meteorology.
- Optical observations.
- Radar observations.
- Infrared observations.

But often complementary solutions are required to fill potential observation gaps, e.g. aerial imagery, field measurements.

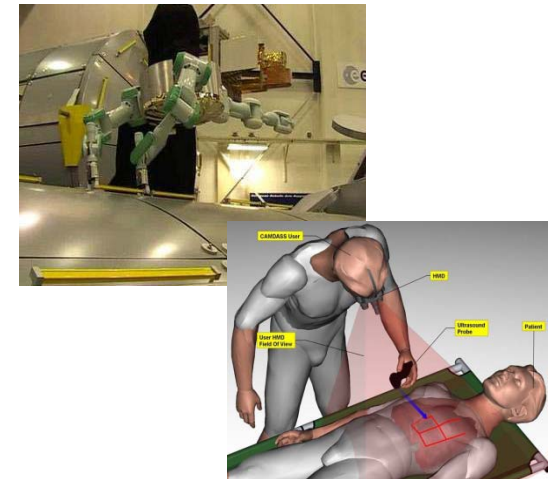
Space borne observation

Airborne observation

In-situ observation

## Human Spaceflight:

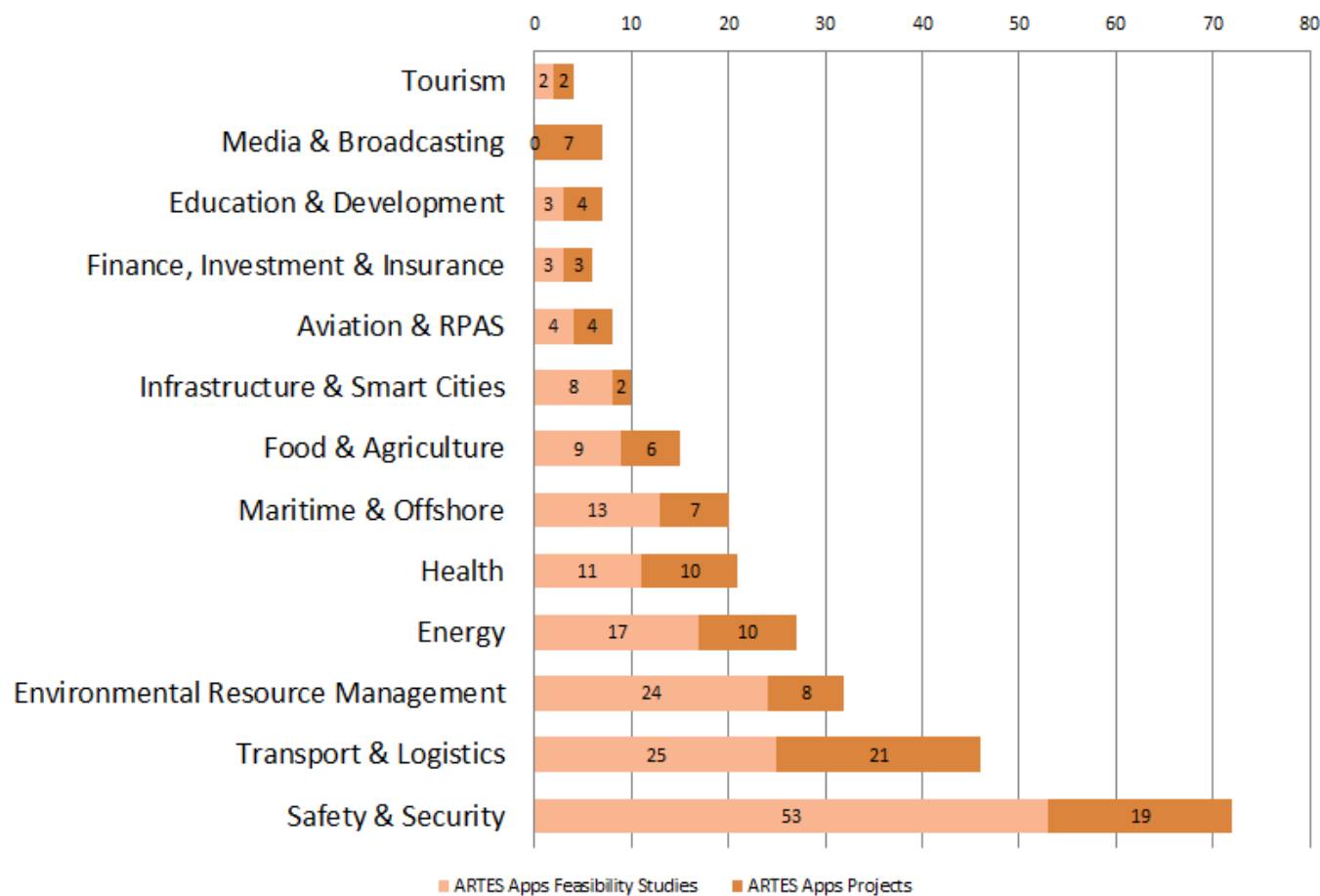
- Platforms for test payloads:
  - Shuttle Radar Topography Mission (SRTM).
- Development of eHealth applications for astronauts.
- Operational payloads on the ISS:
  - Urthecast.
  - Icarus.
- Robotics and Augmented Reality, e.g. Tele-operation systems for maintenance support.





# ARTES Integrated Applications / Services

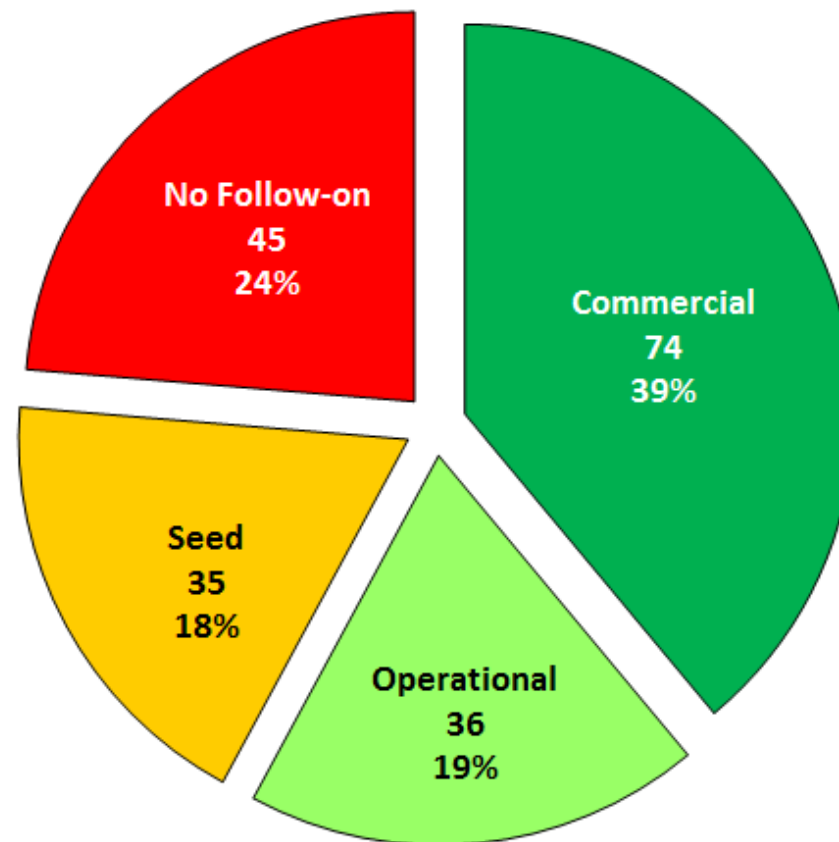
## Thematic Areas



# ARTES Applications Projects - Market Success Rate following Project Implementation



The data collection initiates from the **192** completed and appraised projects from ARTES Integrated applications and service programmes.



# Multiple ARTES Applications activities in the MARITIME domain (indicative)



## Feasibility

## Demonstration

## Operational



## User / Customer Engagement

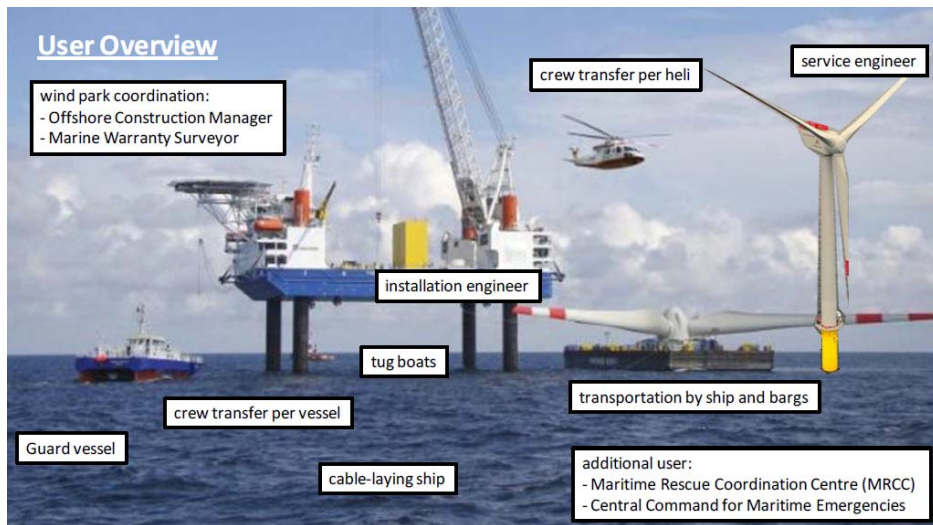
# Example "Com4Offshore"

<https://artes-apps.esa.int/projects/com4offshore>



## "Interactive Communication and Monitoring System for Offshore Wind Energy" Objective:

"One-stop-shop" solution providing communication services to different user groups in offshore wind farm projects, business services in support of offshore logistics and construction workflow as well as wireless sensor solution to support the installation of major offshore components such as foundations and tower segments.



Typical user community during the construction phase of an offshore wind farm

*Consortium: DE*

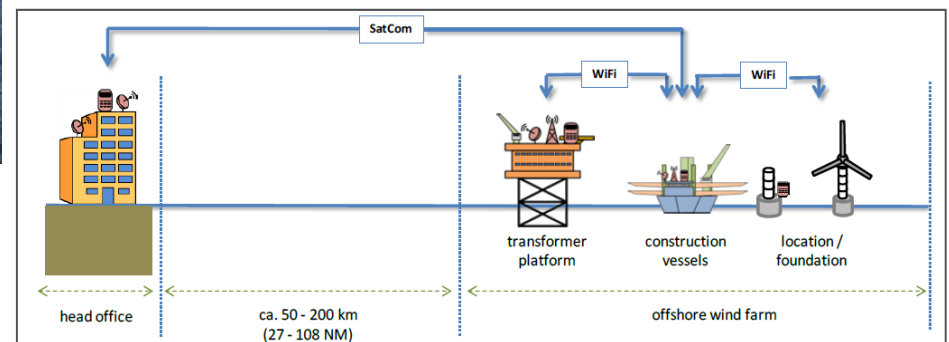
*Involved user: DE Wind Farm Construction Company*

Official Use

**ARTES 3-4 applications project as follow-on from Feasibility Study:**

- 20 months duration
- kick-off in June 2015

Multiple vessels will be equipped with a combined WiFi-Wireless-Satcom solution to ensure permanent service availability



# From Demo Project to Operational Service - What makes the difference ?

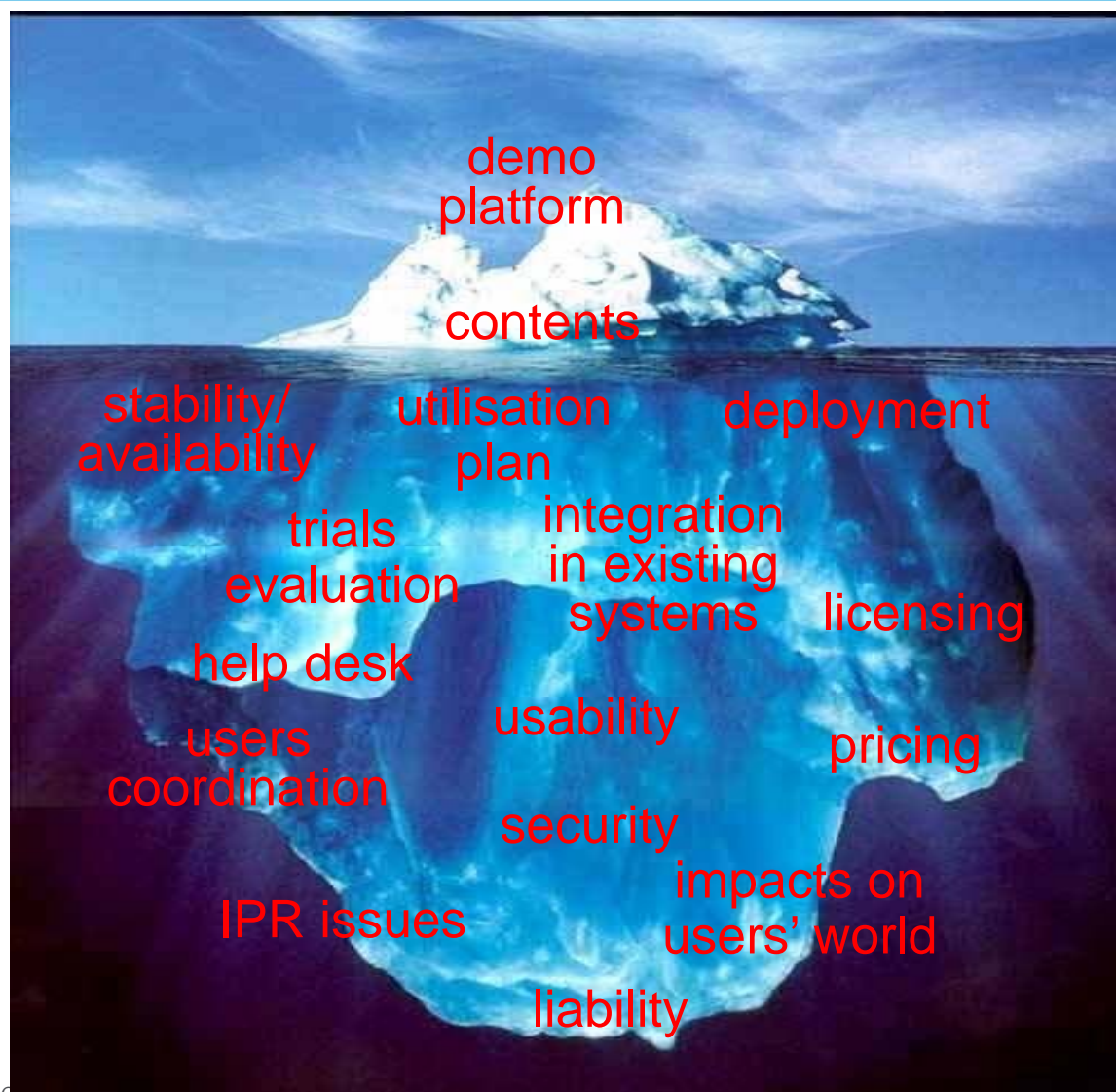


## Feasibility:

Look, it works!

## Sustainability:

It is an available and  
reliable 24/7 service





# EU Copernicus programme



European *independence* & contribution to *global observing system*

Global, timely and easily accessible information

- Data Continuity
- Complementary to Contributing Missions
- Long-term observations
- Open access to data
- Fully operational system
- Comprehensive EO system

Complementary to EU Galileo GNSS programme



Integration of Space and non-Space Assets provides excellent opportunities for enabling new services or innovative improvements in existing services



# Copernicus Space Component



**S1A/B:** Radar Mission - **Land and Ocean services**; 6 days with 2 sats;  
Land cover, soil moisture and water content, frost/thaw state



2014 onwards



**S2A/B:** High Resolution Optical Mission - **Land services**; 5 days with 2 sats; Land cover, biomass, fire frequency, cultivation, harvest, leaf chlorophyll and water content, leaf area index, forest parameters



2015 onwards



**S3A/B:** Medium Resolution Imaging (21 channels) and Altimetry Mission - **Ocean services**; 2 days with 2 sats; Ocean greenness, sea surface temp, sea salinity, scatterometry for winds, water quality and pollution



2016 onwards



**S4A/B:** Geostationary Atmospheric Chemistry Mission - Atmospheric composition monitoring from geostationary orbit



2019 onwards



**S5P:** Low Earth Orbit Atmospheric Chemistry Mission - S5 Precursor to bridge the gap between Envisat (Sciamachy data in particular) and Sentinel-5



2016



**S5A/B/C:** Low Earth Orbit Atmospheric Chemistry Mission - Atmospheric composition monitoring from polar orbit



2020 onwards

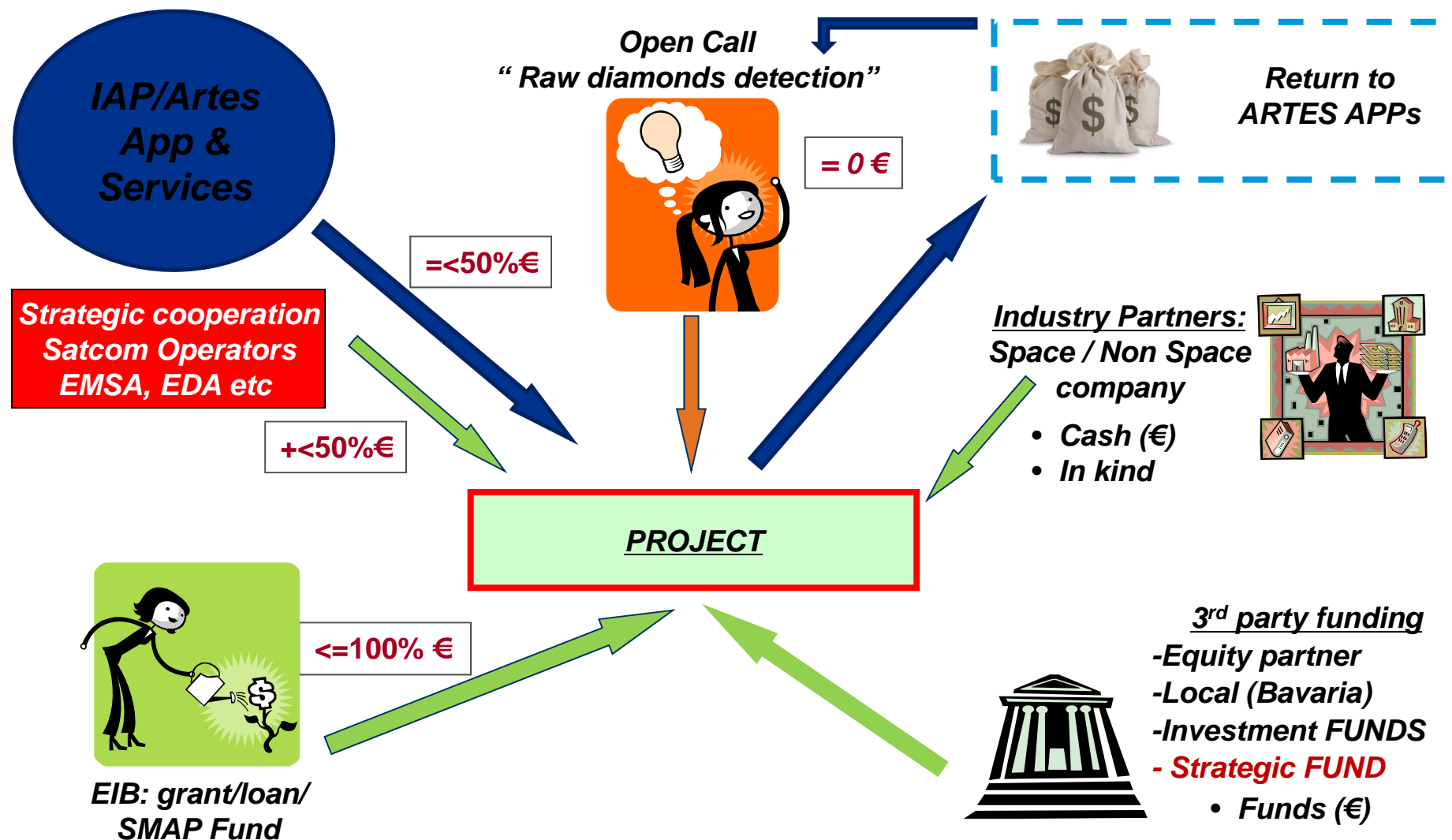


**S6 (Jason-CS A/B):** Altimetry Mission



2019 onwards

# Various options are available within IAP to promote new Applications & Services





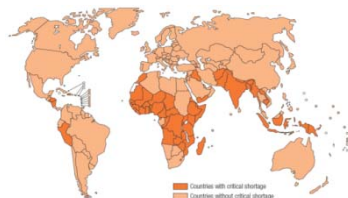
# Enabling Partnerships with Key Institutions



Maritime  
Activities



RPAS  
Activities



eHealth for Sub-  
Saharan Africa



Space for Rail



Space for Mediterranean  
Acceleration Programme



# Space for Med Acceleration Programme (in collaboration with EIB)



MENA region represents a 350 mln people new market opportunity for ESA MS companies with mature applications and services developed under the IAP and other ARTES Applications programmes

GIS Water Infrastructure Mgt  
in Egypt

The **SMAP** 16 mln € fund will foster collaboration between European companies and local entrepreneurs.

FEMIP, Facility for Euro Mediterranean Investment Partnership  
MENA, Middle East and Northern Africa  
S4Med, Space for Mediterranean Programme  
SMAP, Space for Mediterranean Acceleration Programme

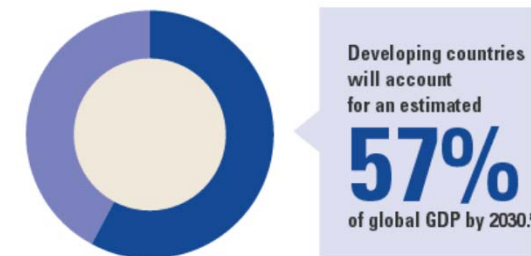
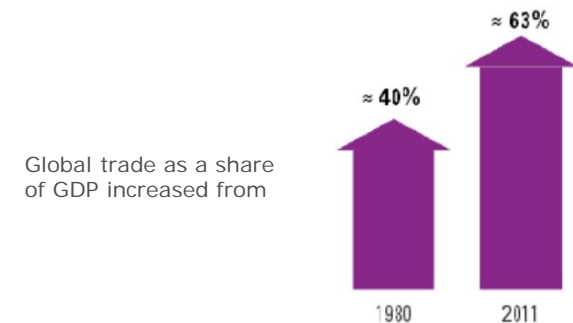
# Future trends in applications and trade



- **Digital Future** - cloud, big data, IoT introduce new services, products, business and delivery models, but also present significant challenges such as robotic technologies replacing workers, privacy concerns and cybersecurity threats.
- **Global marketplace** – Global merchandise trade forecast to grow 8% annually to 2030, outpacing GDP growth.
- **Economic shift** – Driven by trade liberation, economic reforms, free movement of technology, and emerging market economies are increasingly important players.



Of the digital data today was created in the last 2 years

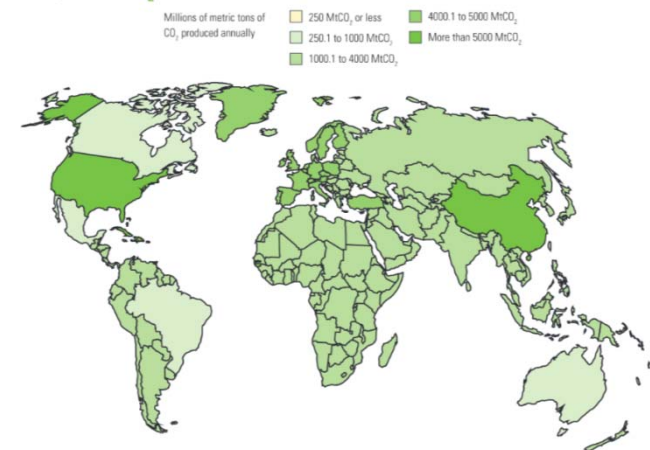


# Future trends in the environment

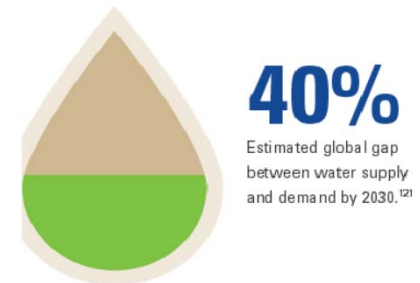


- **Climate change** – Rising greenhouse gas emissions (GHGs) are causing climate change and driving a complex mix of unpredictable changes to the environment, while further taxing the resilience of natural and built systems. Achieving the right combination of adaptation & mitigation policies is required.

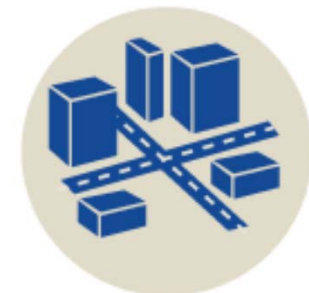
Projected CO<sub>2</sub> emissions in 2030<sup>19</sup>



- **Resources management** - The pressures of population growth, economic growth and climate change will place increased stress on essential natural resources including water, food, arable land and energy.



- **Urbanization** – UN reports percentage of world population living in cities to increase from 54% to 66% by 2050, implying need for investments in transport, ports, airports, water, telecommunications, etc.



- **Mega-constellations** of numerous small cheap satellites.
  - > Near real-time global coverage.
- New commercial players, e.g. Google, Facebook, ...
- Higher bandwidth SatCom.
- **Optical** communications technology, e.g. European Data Relay Satellite (EDRS).
- **Reconfigurable** payload technologies -> greater in-orbit flexibility.
- **Multi-Constellation SatNav** (GPS, Galileo, GLONASS, Beidou, ...)
  - > Better availability of signal.



# ARTES Applications portal – artes-apps.esa.int



→ EUROPEAN SPACE AGENCY TELECOM LOG OUT USER ACCOUNT

## artes applications

HOME OPPORTUNITIES PROJECTS COMMUNITY PORTAL

ARTES Applications Portal

- About ARTES Applications
- Event Calendar
- News
- Documents

ARTES 20 Integrated Applications Promotion

- Overview
- Working with ARTES 20 IAP
- Funding Schemes
- Proposal Guide

ARTES 3-4 Satcom Applications

- Overview
- Working with ARTES 3-4 SATCOM-APPS
- Funding Schemes
- Proposal Guide

Media

- Videos

Contact & Support

### HOME

→ 4th ARTES APPLICATIONS WORKSHOP

29–30 April 2014

Chamber of Commerce Luxembourg

→ REGISTER ONLINE NOW

### LATEST NEWS AND EVENTS

Industry Day On Joint ESA-EDA Demonstration Project DESIRE II

ESA and the European Defence Agency (EDA) are pleased to announce an informative Industry Day for the **21st of March** on the second element of the "Demonstration of the use of Satellites complementing Remotely Piloted Aircraft Systems integrated in non-segregated airspace (DESIRE II)", whose tendering release under the ESA procurement rules is imminent.

### EVENT CALENDAR

« MARCH »

M	T	W	T	F	S	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

## HOME

News, Funding Schemes,  
Proposal Guide, Event  
Calendar

## OPPORTUNITIES

Open Competitions, Call for  
Proposals, Call for Ideas

## PROJECTS

Success Stories, Latest  
Projects, Project Filters

## COMMUNITY PORTAL

Ambassador Platforms,  
Discussion Forums



## ONE SINGLE GATEWAY

for all ARTES Applications  
programmes

# Other Contacts and Further Information



*Thanks for your attention !*

- Tony Sephton: [tony.sephton@esa.int](mailto:tony.sephton@esa.int)
- ARTES Applications Website: <http://artes-apps.esa.int/>
- ARTES Applications Open Calls for co-funded activities on EMITS at:  
<http://emits.esa.int> (ITT AO6124, AO5891, AO5658)
- Information on ARTES Applications Opportunities at:  
<http://artes-apps.esa.int/opportunities>

