ARTES

DIGITAL TRANSFORMATION AND GREEN ECONOMY THEMATIC CALL

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1. ACRONYMS

AI	Artificial Intelligence
AIX	AI Express
APQ	Activity Pitch Questionnaire
AoF	Authorisation of Funding
ARTES	Advanced Research in Telecommunications Systems
AR	Augmented Reality
AT	Advanced Technology
BASS	Business Applications
BC	Business Case
BP	Business Plan
CAPEX	Capital Expenditures
C&G	Competitiveness and Growth
CC	Core Competitiveness
CMIN	Council of Ministers
DG	Director General
EC	European Commission
ESA	European Space Agency
ESOC	European Space Operations Centre
EU	European Union
FP	Full Proposal
FRMCS	Future Railway Mobile Communication System
GAIA-X	European Association for Data and Cloud
GPL	Generic Programme Line
GS	Ground Segment
HW	Hardware
IoT	Internet of Things
IRIS	Satellite Communications for Air Traffic Management
JCB	Joint Board on Communication Satellite Programmes
MS	Member States
ML	Machine Learning
NoI	Notification of Intent
NG	Next Generation
OP	Outline Proposal
OPEX	Operational Expenditures
PP	Public-Private Partnership
SEI	Socio-Economic Impact
SME	Small and Medium sized Enterprise
SPL	Strategic Programme Line
TIA	Directorate of Telecommunications and Integrated Applications
TBC	To Be Confirmed
TBD	To Be Defined
VR	Virtual Reality
4S	Secure Satcom for Safety and Security

2. OVERVIEW

This document presents an overview of the "Digital Transformation and Green Economy" Thematic Call issued under the ARTES Programme. The call offers the opportunity to companies to bring forward their business proposition, which shall leverage on space and advanced digital green technologies for delivering sustainable solutions.

Four themes are proposed under the overall umbrella of this thematic call::

1. Artificial Intelligence and Machine Learning, Cloud and Virtualisation;

2. Digital Twins;

3. Sustainable Mobility;

4. Green Value.

These themes have been selected based on the following criteria:

- High potential markets, where space-based solutions can deliver an important Socio-Economic Impact (SEI);

- Opportunity of leveraging on the existing and emerging macro telecommunication/digital trends and addressing fundamental needs of the society;

- Alignment with the strategy of ESA and the Directorate of Telecommunications and Integrated Applications (TIA), notably Digital and Green Commercialisation is one of the main elements of ESA Agenda 2025 and one of the TIA priorities;

- Vertical and horizontal integration since the Thematic Call covers multiple themes and facilitates value chain integration between Technology, Products, Services and Applications

3. BACKGROUND AND RATIONALE

3.1. State of Play

Society is currently experiencing a transition in the Digital and Green Economy area, which is revolutionising business models, technology innovation and use, consumption and offering of applications, and sharing of knowledge involving both human and machine spheres.

Digital transformation is defined as the integration of digital technology into all areas of a business resulting in fundamental changes to how businesses operate and how they deliver value to customers, increasing the competitiveness of the industrial sectors, impacting not only the private but also the public sector including agencies and organisations.

Green economy is defined as low carbon, resource efficient and socially inclusive economy, pursuing knowledge and practices that can lead to more environmentally friendly and ecologically responsible decisions and lifestyles, which can help protect the environment and sustain its natural resources for current and future generations.

Satellite based communications, potentially combined with other space assets, will play a major role in the Digital Transition and Green Economy. Therefore, ESA issues a Thematic Call to support companies in delivering their business propositions.

3.2. Rationale

The increasing number of green related activities engaged under the ARTES programme has confirmed the appetite by user communities for business propositions delivering green value through space and the interest of the commercial sector to invest in economic sustainable green solutions. As an example, recently, the IRIS Programme has set the initial steps towards reducing the environmental footprint of commercial aviation.

At the same time, previous thematic calls on digital technologies like the kick-start on Space and AI and the one on Immersive Reality as well as the growing number of technology and products development activities under ARTES AT and C&G adopting digital solutions have demonstrated the large interest from Industry in particular SMEs and start-ups on these topics.

TIA's vision towards the Digital and Green Space is centred on the ARTES Programme that provides an ideal framework to facilitate the Digital & Green transformation through satellite communications for the next decade, by fostering new digital technology, products, services and applications which will help all economic sectors in Europe (including Space) to meet the environmental targets of the EU and ESA Member States. At the same time, TIA is coordinating with other Directorates, that are working towards collecting and enabling the use of space data for the purposes of the Green Deal. This thematic call, while supporting companies in delivering their business propositions, will at the same time enable ESA to engage with space and non-space stakeholders and derive potential interest and requirements for pursuing further potential initiatives and activities in this topic.

4. SCOPE OF THE THEMATIC CALL

The Thematic Call is in line with ESA's strategy and the DG's Agenda 2025 that targets to boost commercialisation for a Digital and Green Europe, by fostering the development of digital technologies, products and applications targeted by the European Green Deal. Among the domains addressed by the call, there are sustainable and smart mobility (connected and automated, multimodal transport) and the transition towards a fully integrated, inter-connected and digitised European energy market. Other vertical sectors, such as urban sustainability, food and agriculture, management of natural disasters, clean waters, are relevant as well.

The Thematic Call covers the following four themes:

1. Artificial Intelligence and Machine Learning, Cloud and Virtualisation;

2. Digital Twins;

3. Sustainable Mobility;

4. Green Value.

The Proposal(s) by the Industry can cover multiple themes and vertical integration between Technology, Products, Services and Applications. The Proposal(s) can also cover one or multiple phases of the full life cycle of activities including definition, technology and product developments, and demonstration in a pre-operational environment

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4.1. Theme 1: Artificial Intelligence and Machine Learning, Cloud and Virtualisation

i)   Artificial Intelligence and Machine Learning (AI/ML)

Definition:

The use and development of computer systems that are able to learn and adapt without following explicit instructions, by using algorithms and statistical models to analyse and draw inferences from patterns in data.

Impact:

AI/ML is revolutionising our society. AI-driven technology brings unique opportunities to Satcom; processes acceleration, resources optimisation, risk reduction and faster decision making in Operations.

ii)   Cloud and Virtualisation

Definition:

The delivery of computing services (servers, storage, databases, networking, software, analytics, and intelligence...) over the Internet ("the cloud") to offer faster innovation, flexible resources, and economies of scale.

Impact:

Cloud & Virtualisation technology is significantly changing business models in Satcom; allowing HW commoditisation, closer interaction with end users, higher data processing and creating the foundation for sovereign infrastructures.

Figure 1: Opportunities for ESA Member States around Theme 1: AI/ML, Cloud & Virtualisation

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4.2. Theme 2: Digital Twins

Definition:

A virtual representation that serves as the real-time digital counterpart of a physical object, system or process.

Impact:

Digital twins are expected to impact every industry by enabling real-time comprehensive oversight over physical objects, products, systems and processes, be those satellites and constellations, vehicles, manufacturing processes and supply chains, built infrastructure or entire cities. This enabling drastic advances in efficiency, predictive, design and simulation capabilities.

Figure 2: Opportunities for ESA Member States around Theme 2: Digital Twins

4.3. Theme 3: Sustainable Mobility

Definition:

Sustainable Mobility refers to technologies and services for the mobility and transport of passengers and goods that are sustainable in the sense of social and environmental impact. It includes the intelligent use of energy, digital technology and transport infrastructure for Sea, Air and Land.

Impact:

Satcom is critical for ubiquitous connectivity across all transport domains be it for mission critical or added-value applications. Such applications require advances in Satcom capabilities across the space, ground and user segments and as such will fuel an expanding Satcom market. Mobility is a critical

component of national and international trade, climate change mitigation, quality of life for citizens, and the global economy, and as such new mobility services will have broad influence.

Figure 3: Opportunities for ESA Member States around Theme 3: Sustainable Mobility

4.4. Theme 4: Green Value

Definition:

Green Value refers to economic development that attempts to satisfy the needs of humans in a manner that sustains natural resources and the environment for future generations.

Impact:

As humanity faces an imminent climate crisis it is imperative that new services are developed addressing the needs of not just their customers but also the environment. Satcom is invaluable in providing connectivity to various green use-cases for the transmission and retrieval of data. Satcom itself should see improved efficiency in deployment across the full value chain (manufacturing, supply chain, assembly, launch, operations and service provision) in order to be sustainable throughout the future.

Figure 4: Opportunities for ESA Member States around Theme 4: Green Value

5. OBJECTIVES

The objectives of the Digital and Green Thematic Call are to:

- Develop and facilitate the adoption of innovative digital technology integrated with Satcom solutions to boost sustainable mobility and green value;

- Support the emergence of green services in the vertical markets, establishing Space as part of a green ecosystem of users, Industry (space and non-space) and Institutions engaged in the green transition;

- Build partnerships with champions, early adopters and anchor users to foster development and utilisation of upstream and downstream end-to-end connectivity solutions complemented by big data/AI and other space resources;

- Collect ideas and requirements on the domains of digital technology/applications and connectivity-based green solutions paving the way to future initiatives/Work Plans in ARTES and in ESA;

- Reach out to non-space communities that are active in the green transition and facilitate networking with space and new-space actors and pursue international collaborations to support global adoption and interoperability;

- Support the implementation of federated Digital Space infrastructure/elements

The purpose of this Thematic Call is multi-fold:
- Facilitate Industry to capture the large and cross-sectoral business opportunities in the identified themes: disruptive business models are emerging thus creating significant opportunities for

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industry, including upstream and downstream space businesses, New Space, SMEs and terrestrial spin-in players;
• Enable paradigm shifts towards interdisciplinarity and cross-sectoral co-operation, agile delivery tools with a simplified single point of access bridging across ARTES frameworks

6. PROCUREMENT APPROACH

The proposals to be submitted in the context of this call shall be implemented in accordance with the current tools provided by ARTES GPLs (Generic Programme Lines) and/or SPLs (Specific Programme Lines) in direct negotiation (co-funded) with Industry, depending on their nature and scope, and in coordination with National Delegations.

Existing ARTES mechanisms shall be used without modification. The eligibility criteria shall be in line with the ARTES implementation rules.

The call aims at attracting specifically SMEs, New Space and Spin-In Industry, although open to all Industry in ESA Member States participating in the ARTES programme. To this purpose, an Activity Pitch Questionnaire (APQ), based on a template provided by ESA, shall be used as entry point for companies to submit their idea, providing a simplified and single point of access to the ESA ARTES framework. On the basis of the received Pitch, ESA will guide the Industry towards the the most suitable programme element.

The decision on the most suitable ARTES programme line will be taken on a case-by-case basis by ESA in consultation with the Industry and the involved National Delegation(s), and in line with the ARTES Declaration and Implementing Rules. According to the rules of the ARTES GPL and SPL programmes, the price of activities carried out in a given ESA Member State are charged against the contribution of that State in the programme. Letter(s) of Authorisation of Funding (AoF) from the relevant National Delegation(s) is(are) therefore required as part of the Full Proposal. The Industry is however advised to inform the relevant National Delegation(s) when submitting the Pitch. The coordinates of the National Delegates can be found here: https://artes.esa.int/national-delegations

The Proposal(s) by the Industry can cover multiple themes and vertical integration between Technology, Products, Services and Applications. The Proposal(s) can also cover one or multiple phases of the full life cycle of activities including definition, technology and product developments, and demonstration in a pre-operational environment.

7. INDUSTRIAL FOCUS

ESA does not intend to prioritise any particular element of the proposed activities and expects industry to define its own priorities (for instance in line with its business plans). For the same reason, ESA does not intend to prioritise particular domains of innovation in technology, product and service development. These priorities can be further consolidated during a dialogue phase with ESA.

8. PROCESS AND SCHEDULE

8.1. Timeline and Procedure

The Thematic Call is open from October 2021 for a period of 12 months, where the Industry can respond by submission of Pitches. The timeline is illustrated below.
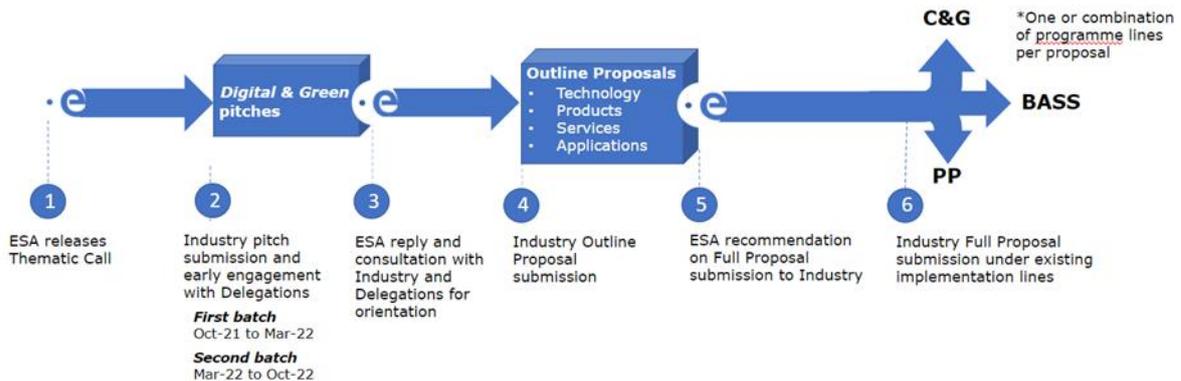

Figure 5: Procurement Approach and Timeline of the Thematic Call

In **Step 1**, ESA will release the Thematic Call.

In **Step 2**, the interested Industry partners are requested to submit their proposal(s) based on a short Pitch template made available by ESA that can be downloaded from the Thematic Call website.

The completed Activity Pitch Questionnaire (APQ) shall be submitted by e-mail to both

- ARTES-CG@esa.int and business@esa.int

stating as subject "DIGITAL TRANSFORMATION AND GREEN ECONOMY <<Proposal Title>>"

The Pitch shall be approved and signed at higher company management level, and indicating their firm commitment to the proposed activity. Multiple Pitches can be submitted.

Pitches can be submitted within two batches (time-windows):

- First batch lasting from October 2021 to March 2022
- Second batch lasting from March 2022 to October 2022.

In parallel the interested Industry shall contact the relevant ESA Member States Delegates to verify their interest and their in-principle support.

In **Step 3**, following an assessment of the Pitch by ESA, ESA will provide a feedback to the company, aiming to provide a reply within 10 working days following the deadline for submission of the Pitch.

It is recognised that some interactions with the Industry may be required and ESA may therefore consult with the Industry and may offer support in providing further clarifications, aimed at better shaping the Outline Proposal(s). Dialogue sessions may be organised individually with potential partners prior to Step 4.

ESA might also consult when necessary with the relevant National Delegation(s) for orientation and will provide key information (e.g. title, cost, price, subcontractor) to the relevant National Delegation(s).

Subject to a positive evaluation of the Pitch and the Industry having informed the National Delegation(s), the Industry will be notified by ESA about the applicable programmatic tool and co-funding scheme and will be invited to submit an Outline Proposal.

In **Step 4**, the Industry will submit an Outline Proposal, based on a template provided by ESA. The Outline Proposal is expanding the Pitch with a more extensive level of details, in accordance with the identified ARTES programmatic line.

In **Step 5**, subject to a positive assessment from ESA and in-principle support from the National Delegations, the Industry will be invited to submit a Full Proposal in accordance with the selected ARTES programmatic line, in one or a combination of ARTES programme lines, being Competitiveness & Growth (C&G), Business Applications (BASS) and Public Private Partnership (PP), and the applicable procurement process.

In **Step 6**, the Industry will submit a Full Proposal with the Authorisation of Funding (AoF) from the relevant National Delegation(s). Following a positive assessment by ESA the proposed activity will be approved for implementation.

8.2. Evaluation Criteria

The evaluation process is non-competitive, as each proposal will be assessed individually on its own merits.

For any Outline Proposal to be considered as an adequate basis for further consideration, the following evaluation criteria will be used:

1. Consortium experience in technical and business matters relevant to the proposed product, technology and applications;
2. Proposed management organisation, including management of risks;
3. Adequacy of cost and funding;
4. Potential for future evolution towards an commercial solution on a global market and/or towards European opportunities and associated return on investment;
5. Market potential and credibility of business planning, potential to deliver positive net socio-environmental impact

8.3. General Conditions

The submissions and all correspondence relating to it shall be in English.

The tender shall not contain any Classified Information, whether in the Pitch, Outline Proposal or in the Full Proposal.

To avoid any confusion with Classified security markings, the unclassified protective marking used by the Tenderer in the proposal shall not contain the terms: "Restricted", "Confidential", or "Secret".

However, should the Tenderer consider necessary to include Classified Information in the tender, the Tenderer shall inform beforehand the Security Officer.

The Tenderers are informed that Classified Information can be shared with ESA only in compliance with the Project Security Instruction (PSI) duly established by the Agency beforehand and subject to the approval by the ESA Member States.

The Agency will treat commercially sensitive or proprietary information confidentially and solely for the purpose of the assessment of the response.

Expenses incurred in the preparation and dispatch of the response to the announcement will not be reimbursed. This includes any expenses connected with a potential dialogue phase.

The announcement does not bind the Agency in any way to place a contract. The Agency reserves the right to issue amendments to the announcement.

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