R&D WITH ESA - OSIP OPTIONS AND OPPORTUNITIES FOR



### The European Space Agency





22 Member States

4 Associate Members
1 Cooperating State



Implements 60% of the European space budget 120+ unique missions 40+ missions upcoming

2024 Budget

7.79bn =

12 per European

Through European cooperation and with international partners



#### THE GLOBAL CONTEXT FOR SPACE IS SHIFTING ...



#### Space sector: profound & accelerating transformation

- New Actors & private investment
  - new players, increasing budgets, entrepreneurial approaches
- Disruption/ industrialization/ risk taking
  - reusability, mega-constellations, connectivity, AI, quantum...
- Space race
  - in exploration and security & dual use
- Importance of Space assets
  - climate, security, competitiveness, energy, digital, autonomy...



#### ESA Technology Approach: Faster, Focused and Future Ready



#### **FASTER**



Streamlined Technology Programmes

#### **FOCUSED**



Targeted goals for maximum impact

#### **OUTSIDE-IN**



Innovation driven
Quantum
Cybersecurity
AT

# SIMPLIER PROCESS



Coherent Less complex Effective

#### BEYOND TECHNOLOGY



Mindset
Policy
Standards
Engaging with
Industr & Academy

DRIVING EUROPE SPACE FUTURE WITH PURPOSE, FOCUS AND INNOVATION



#### Quantum Technologies

Towards Connected Quantum
Networks

1- Quantum Entanglement Networks;
2- Quantum Sensors;
3- Atomic Clock Networks

# Artificial Intelligence

Al for

1- Design and Engineering;
2- Operations;
3- Insights from data;
4- ESA efficiency & effectiveness
Using AI Competence Centre + Expert Network

#### Cybersecurity

**Develop security building blocks** 

1- Ensure minimum baseline for all2- Offer advanced solutions for missions needing it

#### RESEARCH AND DEVELOPMENT



# Disruptive Ideas

- Taking risk
- Low budget
- Fast and Open
- Novelty driven
- Commercialisation
- Research, studies and tech.dev
- Outside driven (OSIP)
- Open competitive

Discovery

### Future Missions

- Solid baselines
- Smart Customer
- For all domains
- (Pre-)Phase A
- MBSE, ODebris, LCA
- Commercialisation
- ESA driven
- Open competitive

Preparation

### Technology

- low TRL
- Generic
- Missions enabling technology
- 2yr Work plans
- SME focus
- ESA driven
- Open competitive

TDE

- higher TRL up to 9
- SupportCompetitiveness
- Work plans and industry-driven
- SME focus
- Delegation support
- 3 Elements:

  develop, make, fly
  - + Components

**GSTP** 

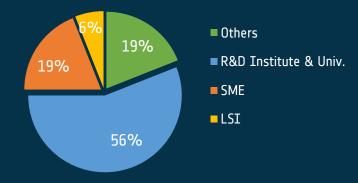
# Discovery Element

- → Open Science Open innovation to discover and explore the disruptive innovation of tomorrow
- → Activities via Open Space Innovation Platform (OSIP)
  - External driven Reaching out for best ideas from anybody
  - → Lowest ever entrance barrier to space innovation
  - → Inverted logic: first smart idea, then the process
  - → Fast feedback, engagement and decisions
- Exploratory first steps funded:
  - → co-sponsored research, studies and early technology development activities
- → Integrates Commercialisation objectives of Agenda 2025

→ DISCOVERING TOMORROW'S INNOVATION







#### Discovery year in numbers:

~150

activities

100%

Industry/Academia driven Open Competition ~15m€

contracts

~75%

SME's, R&D inst. and academia

#### FIRST STEPS FOR NOVEL IDEAS - DISCOVERY ELEMENT PROCESS STEPS





#### Your Novel Idea

Your action

- You focus on describing your idea in form of an abstract
- No need for formalities
- Submit any time to Open Discovery Channel on OSIP
- Ideas for future commercially viable activities welcome

#### OSIP Channel

- Permanently open
- All novel space ideas welcome

#### OSIP Campaigns

- Time limited
- ESA defined challenges / topics



#### OSIP (ideas.esa.int)

- ESA gives you feedback
- ESA channels ideas to best implementation path
- Monthly evaluation for Discovery channel ideas
- Best ideas invited to be matured into proposals

# Discovery Contracts

- Following competitive evaluation
- Co-sponsored research (<90k)</li>
- Study (<100k)</li>
- Early Technology Development (<175k)</li>



Programme specific

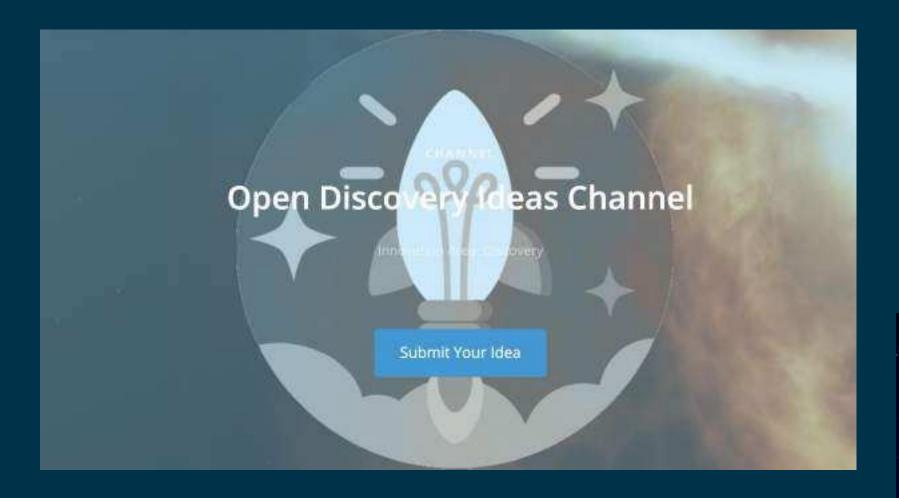


https://ideas.esa.int

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#### Open Discovery Ideas Channel







#### **Discovery Schemes**





You have a novel idea relevant to space? Then follow these three easy steps:

- $oldsymbol{1}$ . Go to ideas.esa.int, look for thematic Campaigns or enter the Open Ideas Channel
- 2. Check whether your idea is novel and eligible in case of doubt: ask on OSIP
- 3. Submit your idea and start discussing with ESA experts







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#### DISCOVERY AND PREPARATION VIA OPEN INNOVATION



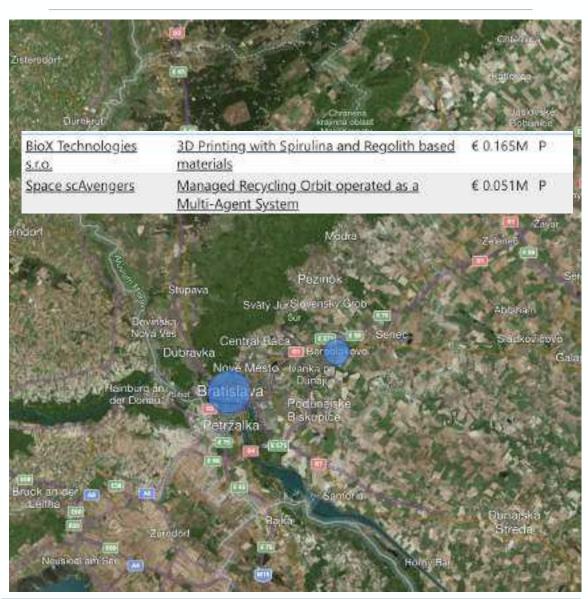
#### LATEST CAMPAIGNS



#### DISCOVERY AND PREPARATION - IDEAS FROM SLOVAKIA







#### DISCOVERY AND PREPARATION - ACTIVITIES WITH SLOVAKIA







#### Objective

This project proposes to develop and test the utilisation of locally available resources during lumin exploration, particularly focusing on suntringolith line Linescopita (Spirulina) as potential medicinals. for in-situ Resource Liferation (ISPA), Luntringolith offers verious siess, including fuels, caypen. waler, streeting, and construction material for addition municipating. Meanwhile, Specific to a pomentully invariable local material provider visites MEU-SSA project, a European community's specification distallar ille support system. Spirutive/s potential uses encompass foot production. www.and.oxygan.necyoling.

In this ploject, it is proposed to go beyond its primary pursons of CCD and extrate-recycling as evel as food cilipation. If will also be used as additive into parts transferring via Puesd Granular Factoration (FIGF-) to playing, these horizon (SHO) has explored the use of Sprains as a primary component in AD printing (1). While these materials hard prumae, further research and optimization are needed to enhance their powerful applications in lutar exploration and the support systems.

White 20 printing technologies with regolith have been extensively studied. The main novelty somes from the combination of different raw materials including plasticipers, uses (from the cosule unless). migratify promitted and Dynasopers PCC 8505 from the in it to obtained from MELISSA C4s. conspariment. Therefore, large parts of new materials are potentially available in alls, within a future. binar open/settiement, A DoE study chair tie created, hased on the compositions of the terforementioned 3-4 new meterials. The various blenck shall be missed, cities, made into obselo-like pallists and fast into a convenercial 3D FEF printer. We charted properties shall be investigated by standard reachanizal tonata testing la.g. ASTMI of printed test specimens to suggest most aronising formulations of the new blended material.

Specifically, within authory we will

- 1. Find an operaci communation of materials is additived; to produce solid spinulins peliets with material properties authobie for FOF 3D printer, with the partiel finitiation of new instanties. Among the new materials and full organizate obtained from Literappins Indian (PDCBCMS) sublivations which stands from Bioreactor of MELISSA C4a compariment. Explantations including clear and El Aller specific in the space demain, in this pass a regulify simulant.
- 2. Process the toroutations including narvesting of biomass, compositing and antedustrial
- 5. Test 30 printed by of the conspounds
- 4. Peric task specimens for mechanical leading and perform stor-dordond reactionical leating



#### STRATEGIC FRAMEWORK FOR MULTIMAGENT SYSTEM INTEGRATION IN FUTURE IN-SPACE TRANSPORTATION ECOSYSTEMS Events Reports Forum Members Hotory Approved Acretics Missions Paymers Plan



#### Objective

The "Werupped Recycling Orbit aperated as a Matt-Agent System" introduces a groundbroaking approach to space debris management, leveraging the principles of sustainability and innovation to transferring space featests into valuable assets. This concept to thalf on these fourisdiction prioris-

- 1. Deducted Orbital Zone A sponthoofy designated orbit survay as a central hub for the appropriate, processing, and recycling of space detire. By transforming sehind, saretites and rooter todies into recognitative objects proposed for manipulation and recycling. First cone have the groundwisk for a new and of marchit tensores infligation
- 2. Managed Consellation: This pilor envisions a dynamic, adaptive constellation of defanct space objects and managing planterns. By repurposing these objects as both materials and resoluter plotforms, the suntary creditor is self-containing ecosystem in space. This approach not any elevates the threat poles by space delate but also introduces a reset infrastructure for future space. intrations and construction projects, highlighting the potential for provision in the face of
- 3. Multi-Agent Cooperative Systems: The operation of this metagod recycling critic release on educated multi-apert systems, ensuring officiant and subpromous clears reansparient. These systems Inditate a congretions in suite of sensors, including the capture, writing, and processing of space riebre. Through cognishabled Al and machine learning equations. It is network of cooperative agants orchestrates a suprilate intensition knowledges to resource, unbodying the principles of officiency, collaboration, and decreacygical advancement, Manager, by collabilishing the promening, role of the Judkyard Operator, the mission size offers innovative services the debte removal. Hability transfer, and frozing recycling demonstrations, pooling the way for a sustainable future in apacia espiration and utilization



I've time been



















































#### VISITING RESEARCHERS – ACCESS TO ESA LABS



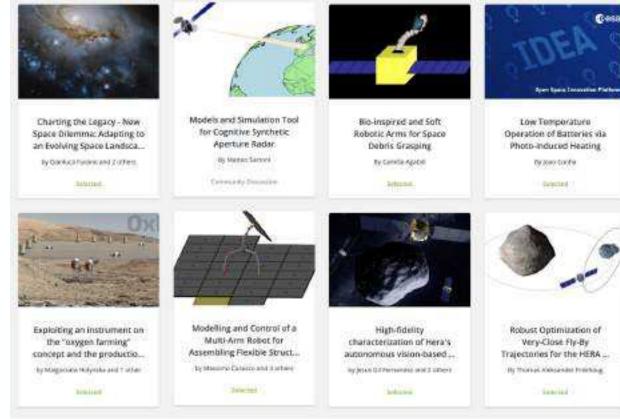
Visiting Researcher schemes aim to support research projects that would benefit from ESA labs, facilities or expertise

**Co-sponsored visiting researcher**Nominally up to 1 year at the ESA site where the ESA Co-supervisor is located.

> 50 researchers

### **Dedicated Visiting Researcher channel:** For any funded research project. (link)

- 8 ESTEC
- 9 participating labs









### Preparation of Future Missions



- Prepares and enables future mission and programmes through
  - pre-phase A studies (including CDF studies)
  - phase-A studies and dedicated system analyses to establish robust trade-offs for mission designs
- Across all ESA activity domains
- Develops open competitive first designs of all new missions based on best concepts without geo-return constraints (encouraging wider participation)
- Technology pre-developments to de-risk mission adoption
- Prepares new mission concepts and programmatic lines
- Supporting industry: MBSE, ODebris, building blocks (ADHA, APA)
- Exploring new roles of ESA (with industry & commercialisation directorate)

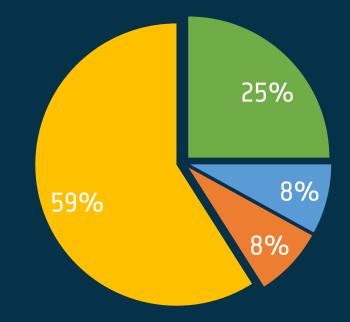
#### Preparation year in numbers:

future mission studies

**ESA Members & Associate Members**  ~16m€

contracts

SME's. R&D inst. and academia



#### **AGENDA 2025**

continuity throughout projects "Digital allows the substantial reduction of cost and errors, and will shorten schedules. ESA will therefore digitalise its full project management, engineering by using Model Based System Engineering".

■ Others ■ R&D Institute & Univ. ■ SME ■ LSI

#### PREPARING NEW MISSIONS - PREPARATION ELEMENT PROCESS STEPS





#### **ESA Mission Definitions**

- New mission concepts from ESA directorates
- CDF Studies preparing solid baselines



- Temporary open idea campaigns on OSIP on new space systems and concepts
- Organised ESA-wide (e.g. what's next campaign) or by directorates (small exploration platforms)



#### esastar

- Preparation Element Work plan (IPC)
- Look for ITT on esastar
- Submit proposal answering Statement of Work (SoW)





#### **Preparation Contract**

- Open competitively awarded across all ESA MS
- Parallel contracts to identify and develop best baseline
- 0.5-2M€ per study

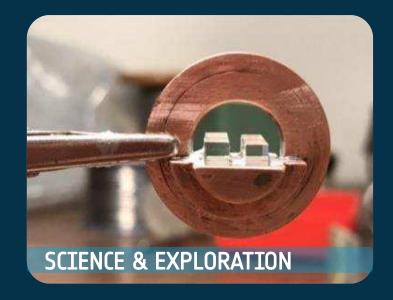


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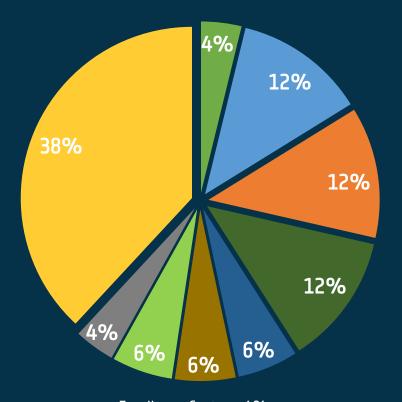
### TDE overview



- → Part of ESA's Mandatory Basic Activities
- → All ESA Member States contribute
- → First step of the implementation of ESA Technology Strategy
- → Relies on European Space Technology Harmonisation Roadmaps
- → Covers all ESA programmes & technology disciplines.







- Excellence Centres, 4%
- Earth Observation, 12%
- Science, 12%
- Exploration, 12%
- Space Transportation, 6%
- Telecommunication, 6%
- Navigation, 6%
- Space Safety and Security, 4%
- Generic Technologies & Techniques, 38%

#### RAISING LOW TECHNOLOGY MATURITY - TECHNOLOGY DEVELOPMENT ELEMENT



## ESA identified technology needs

- ESA published 2yr
   TDE work plans based
   on future mission
   needs (TECNET) and
   ESA Technology
   Strategy
- Across all domains

# esastar

- Look for ITT on esastar
- Form partnerships
- Submit your proposal answering ESA SoW

Your

#### TDE Contract

- Following competitive evaluation
- TRL 1-4 raising technical activity
- ~500k€ per activity
- Parallel contract

### Useful links





- Channel and Campaign.
- Entry to Discovery
   Element
- Submission of preproposals and outline proposals for GSTP.



### esa esa-star

- Registration of new companies
- Invitations to tenders.
- News/Procurement related announcements: TDE WP, GSTP Compendia
   Publication



#### **Activities Portal**

- Running activities
- Visibility on interim
   results and publications
- Updated by contractor
- Simplified interaction with ESA



### Discovery and Preparation

- Discovery & Preparation
- Highlights



### shaping the future

- TDE/GSTP information
- TDE/GSTP achievements
- Reports & highlights



#### **Nebula Public Library**

The knowledge bank of ESA's R&D programmes

- Discovery, Preparation activities achievement summary
- TDE and GSTP coming soon.



