

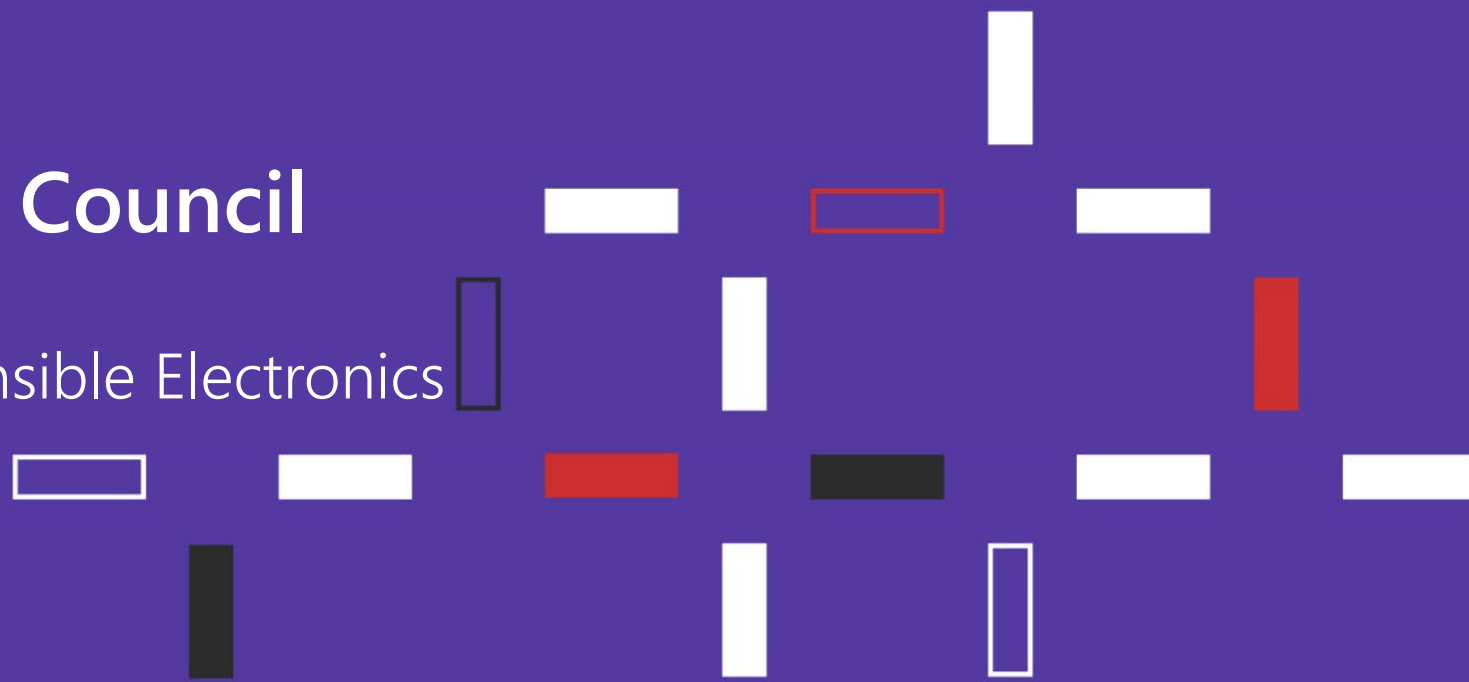


# Backing visionary entrepreneurs

The European Innovation Council

Info Day Pathfinder challenge: Responsible Electronics

February 9<sup>th</sup> 2023





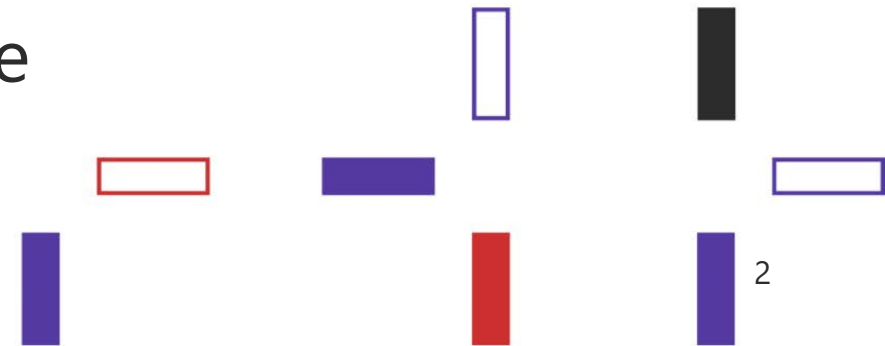
# WELCOME!

- Be aware that **this meeting is recorded**
- **Recording and slides** of the event will be available very soon **on the event page**
- Please submit **your question as Anonymous** in Sli.do if you do not want your name to appear in the recording.



Join at **Sli.do**

With the event code  
**#Challenges**



# Backing visionary entrepreneurs

The European Innovation Council  
InfoDay Pathfinder Challenge  
Responsible Electronics

European  
Innovation  
Council





9 Feb 2023,  
10:00 AM - 10:05 AM  
CET

## Welcome & Introduction

Anne-Marie Sassens (EIC/EISMEA)

10:05 AM - 10:30 AM  
CET

## EIC Pathfinder Challenge – “Responsible Electronics”

Challenge considerations and criteria

Examples of EIC projects in the thematic area of 'Materials for sustainable electronics'

Isabel Obieta (EIC/EISMEA)

10:30 AM - 10:50 AM  
CET

## Q&A

Isabel Obieta & Dalibor Grgec (EIC/EISMEA)

10:50 AM - 11:20 AM  
CET

## Short presentation of potential applicants for Pathfinder projects

Registered participants

11:20 AM - 11:25 AM

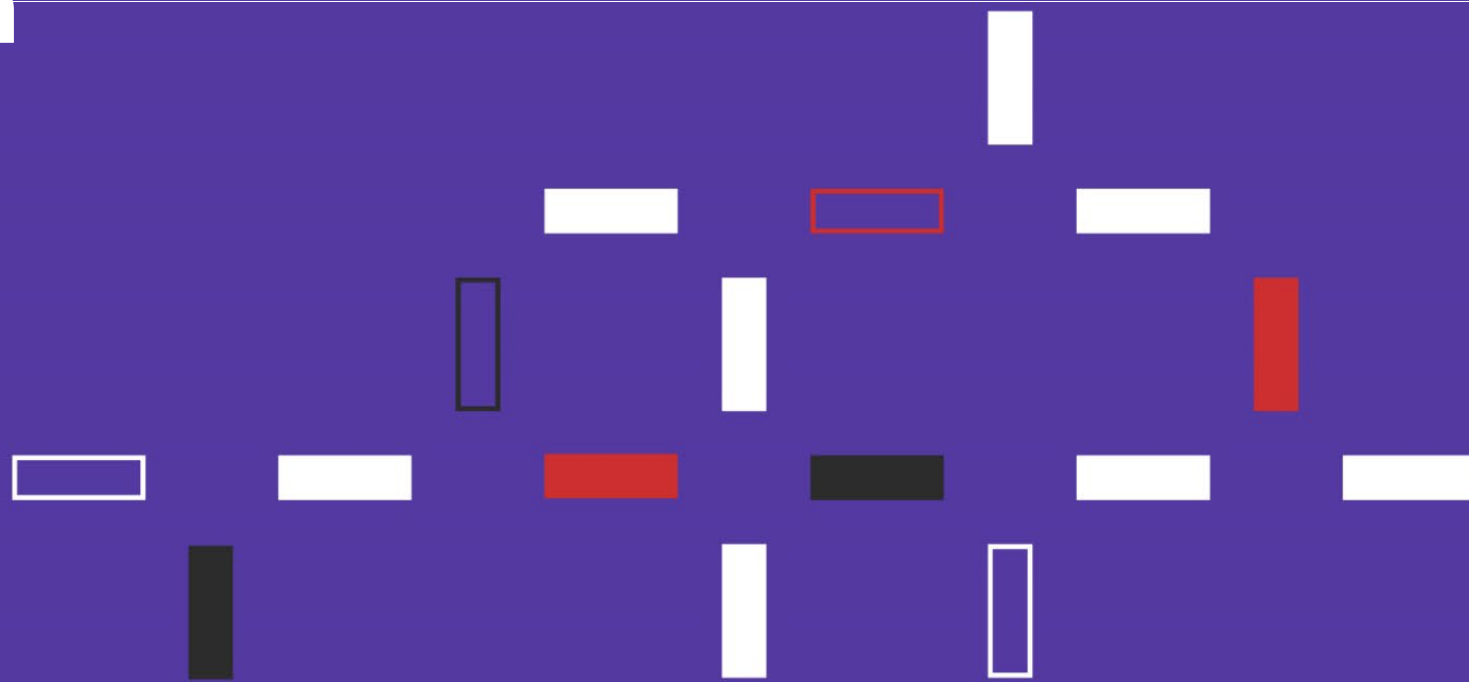
## Conclusions



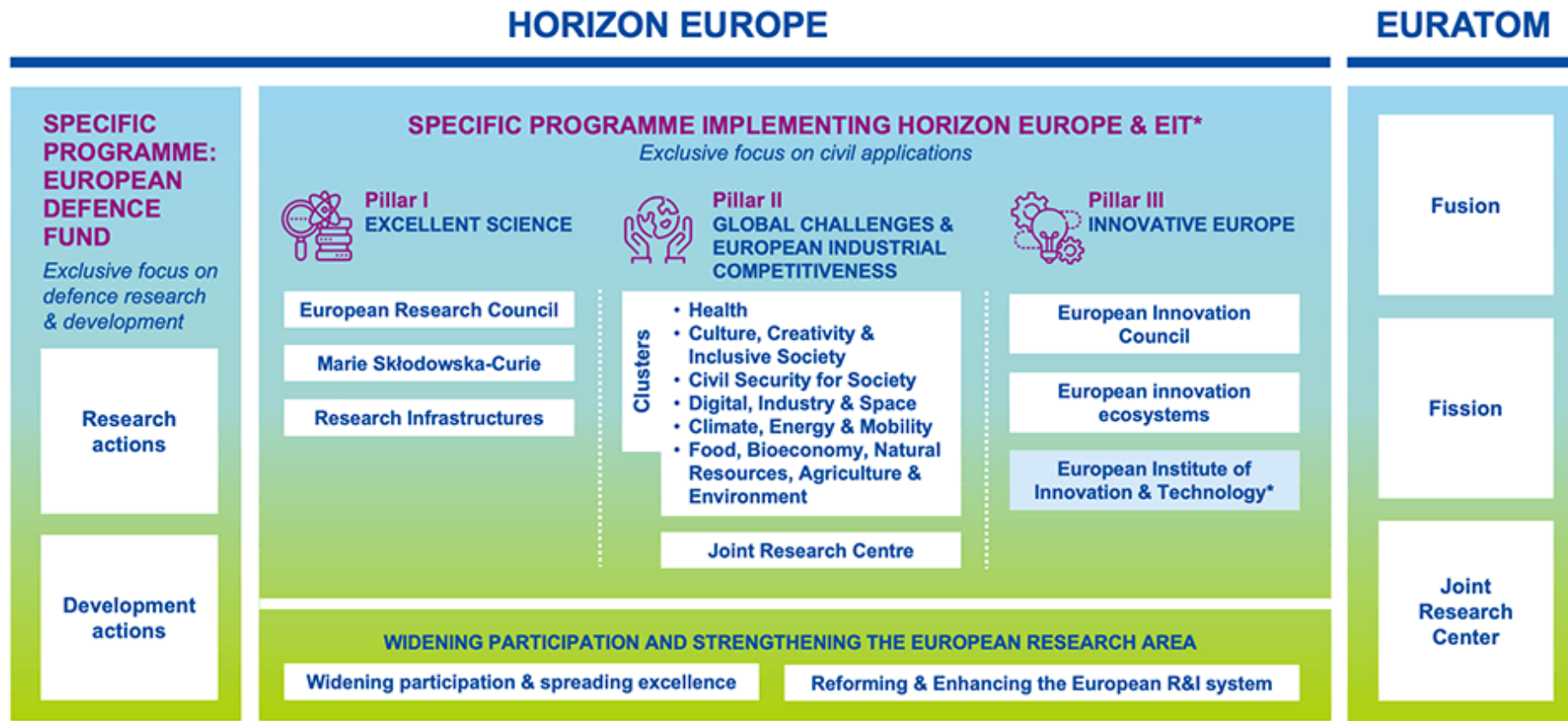


# Introduction

Anne-Marie Sassen



# Horizon Europe is a leading research and innovation programme with €95bn budget for 2021 to 2027



\* The European Institute of Innovation & Technology (EIT) is not part of the Specific Programme



# Work Programme 2023

## What are the main elements?



**Budget €1.6 billion**



**THREE MAIN FUNDING SCHEMES**

### EIC PATHFINDER

Early-stage  
technology research **€343  
million**  
Grants **< €4  
million**



**EIC Pathfinder Open 2023 (€179.5 million)**

Apply by 7 March 2023



**EIC Pathfinder Challenges 2023 (€163.5 million)**

Submissions open 20 June, close 18 October 2023

TRL1-4

Open: for consortia  
Challenge: single, consortia  
Science and research

### EIC TRANSITION

Technology validation  
and spin-out **€128  
million**  
Grants **< €2.5  
million**



**EIC Transition Open (€67.86 million)  
and Challenges (€60.5 million)**

Apply anytime from 1 March,  
cut-offs: 12 April 2023, 27 September 2023

TRL4-6

For consortia  
For single entities  
EIC Pathfinder, ERC PoC  
Business readiness

### EIC ACCELERATOR

Commercialisation  
and scale-up **€1.13  
billion**  
Grants **< €2.5  
million**  
Equity investments **< €15  
million**



**EIC Accelerator Open (€612.98 million)  
and Challenges (€524.73 million)**

Apply anytime,  
cut-offs: 11 January 2023, 22 March 2023,  
7 June 2023, 4 October 2023

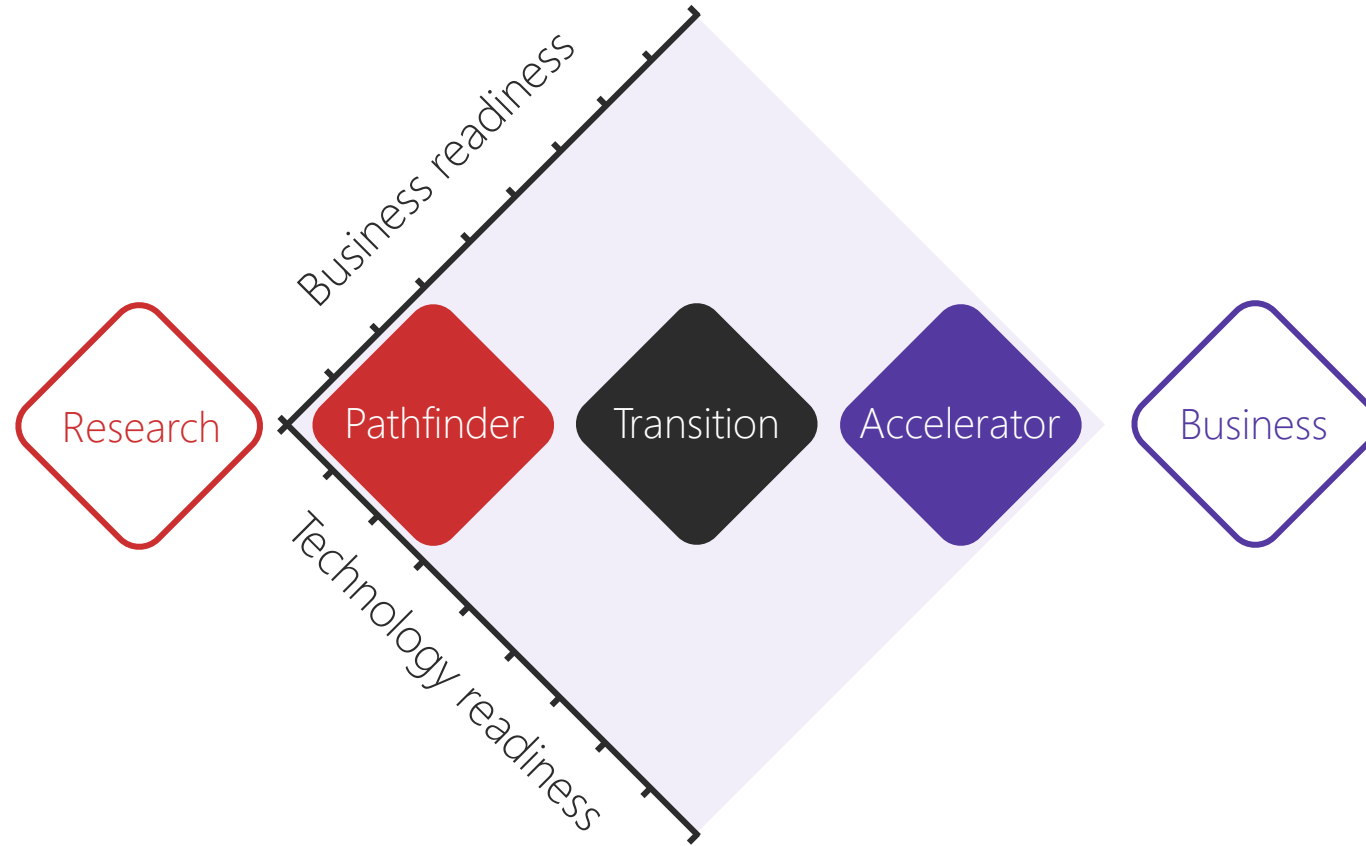
TRL6-9

For individual SME / start-ups  
Innovation scale-up  
Blended finance



EIC stages the entrepreneurial journey as pathfinder, transition, accelerator with increasing readiness levels

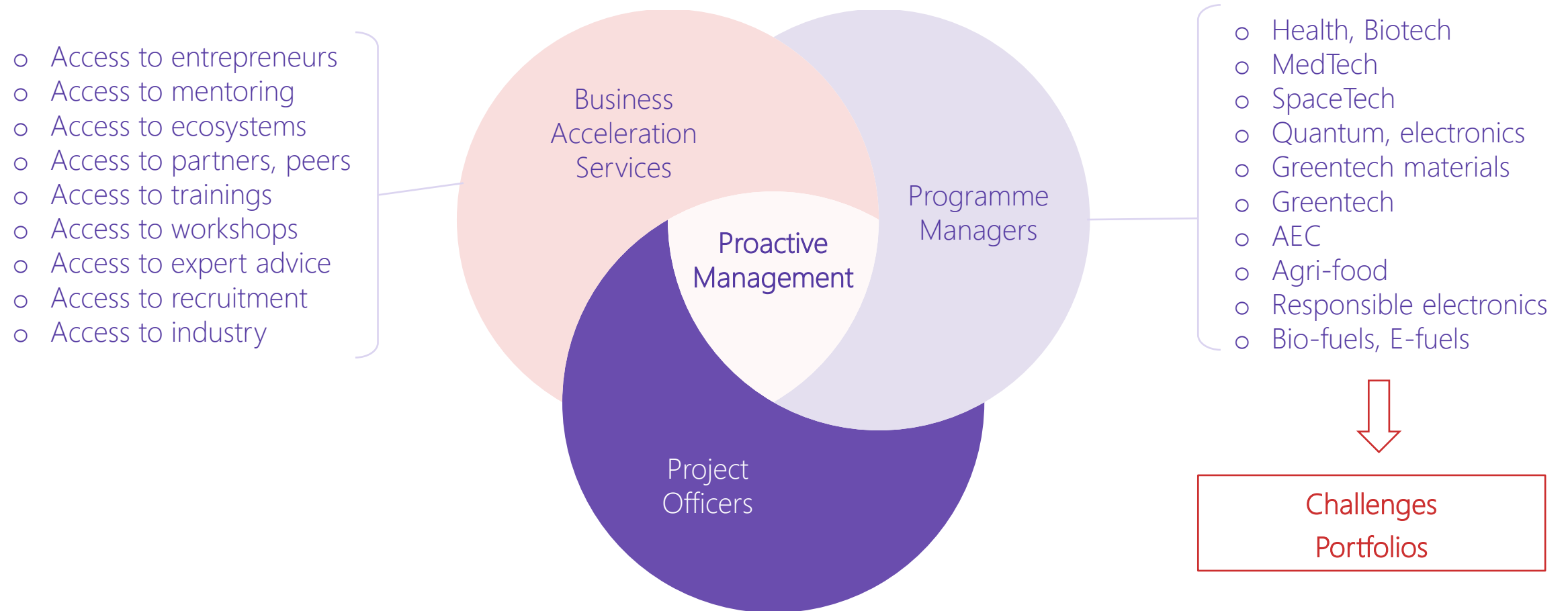
**WHAT?**



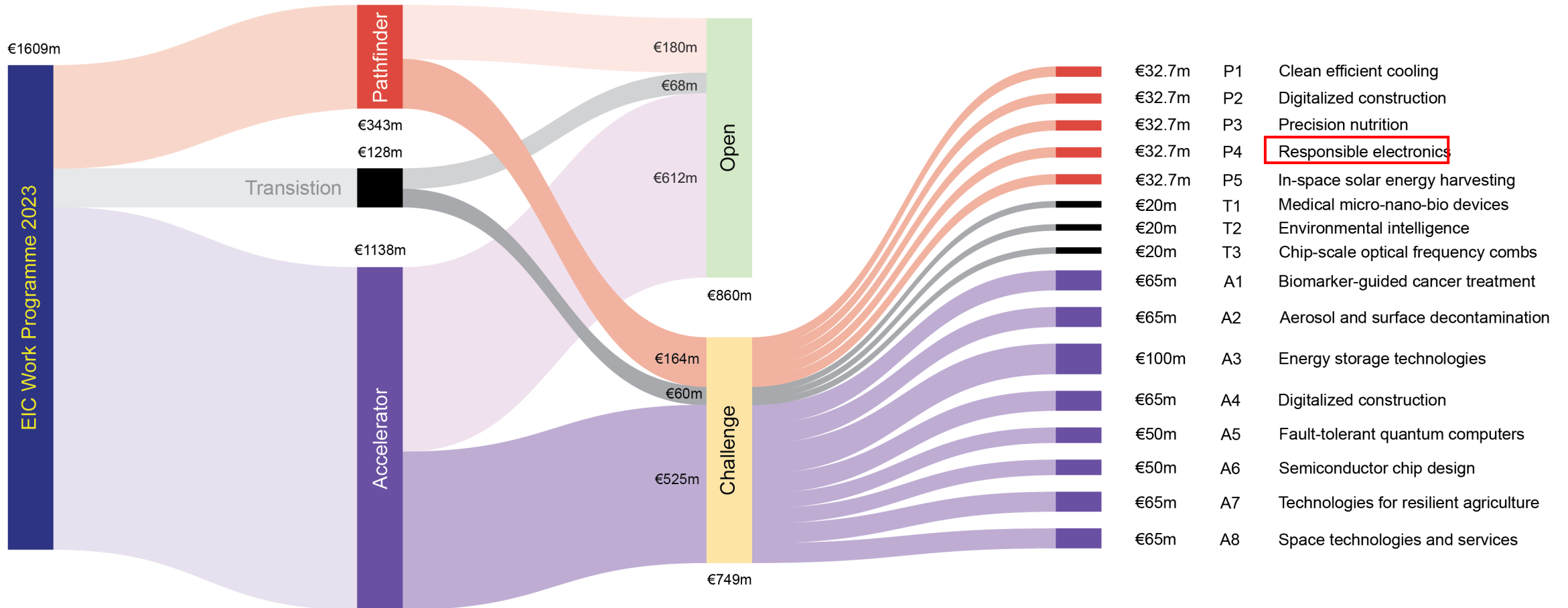
**WHY?**



# With proactive management the EIC aims to maximize its support to success of the entrepreneurial journey



# In 2023 EIC allocates ~€1.6bn to Open and Challenge calls by its Pathfinder, Transition, Accelerator programs



# Cut-off dates of the various calls

Cut-off dates:	Pathfinder	Transition	Accelerator
Open	7 March 2023	12 April 2023 27 September 2023	11 January 2023 22 March 2023 7 June 2023 4 October 2023
Challenge	18 October 2023	12 April 2023 27 September 2023	22 March 2023 7 June 2023 4 October 2023

# Useful links to the EIC Work Programme 2023:

EIC Work Programme 2023:

(the legal basis)



Recording of EIC Info-day 13 December:

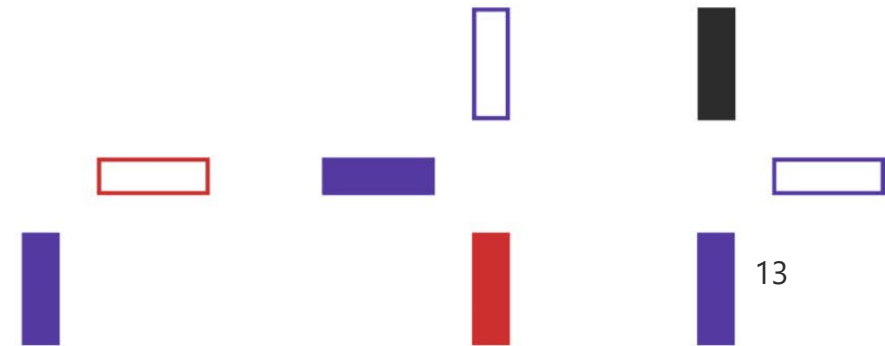
(not repeated today)





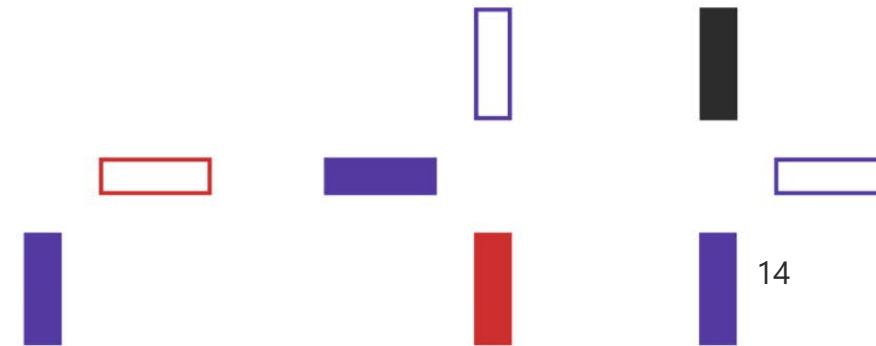
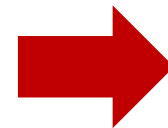
## The goal of this Info-day session:

- Provide some background to the Challenge
- Explain the Challenge as presented in the Work Programme
- Answer your questions regarding the Challenge Call
- Is not to provide you with feedback of appropriateness of your individual proposal to this Challenge call





# The Legal Basis: EIC Work Programme 2023:



# **EIC Pathfinder**

## **Responsible Electronics**



# WP 2023 Pathfinder

## EIC Pathfinder Open



to support **projects in any field** of science, technology or application without predefined thematic priorities ('bottom-up')

## EIC Pathfinder Challenges



to support **coherent portfolios** of projects within predefined thematic areas with the aim to achieve specific objectives for each Challenge





# Pathfinder calls 2023 – Summary table



	Pathfinder Open	Pathfinder Challenges
Total budget	<b>€179.5 million</b>	<b>€163.5 million</b>
Proposals (indicative)	Up to €3 million	Up to €4 million
Funding rate	100% of eligible costs	100% of eligible costs
Opening	10 January 2023	20 June 2023
Deadline	<b>7 March 2023</b> at 17.00 CET	<b>18 October 2023</b> at 17.00 CET
Length of proposal	17-page proposal (part B)	25-page proposal (part B)
Applicants	<p><b>Consortia</b> min. 3 partners from 3 different Member States /Associated Countries (of which at least 1 partner in a Member State)</p>	<p><b>Consortia:</b></p> <ul style="list-style-type: none"> <li>• If 2 partners: from different MS/AC,</li> <li>• Min 3 partners from 3 different MS/AC (of which at least 1 partner in a MS)</li> </ul> <p><b>Single legal entities</b> in a MS/AC</p>

# Background info from the Chips Act

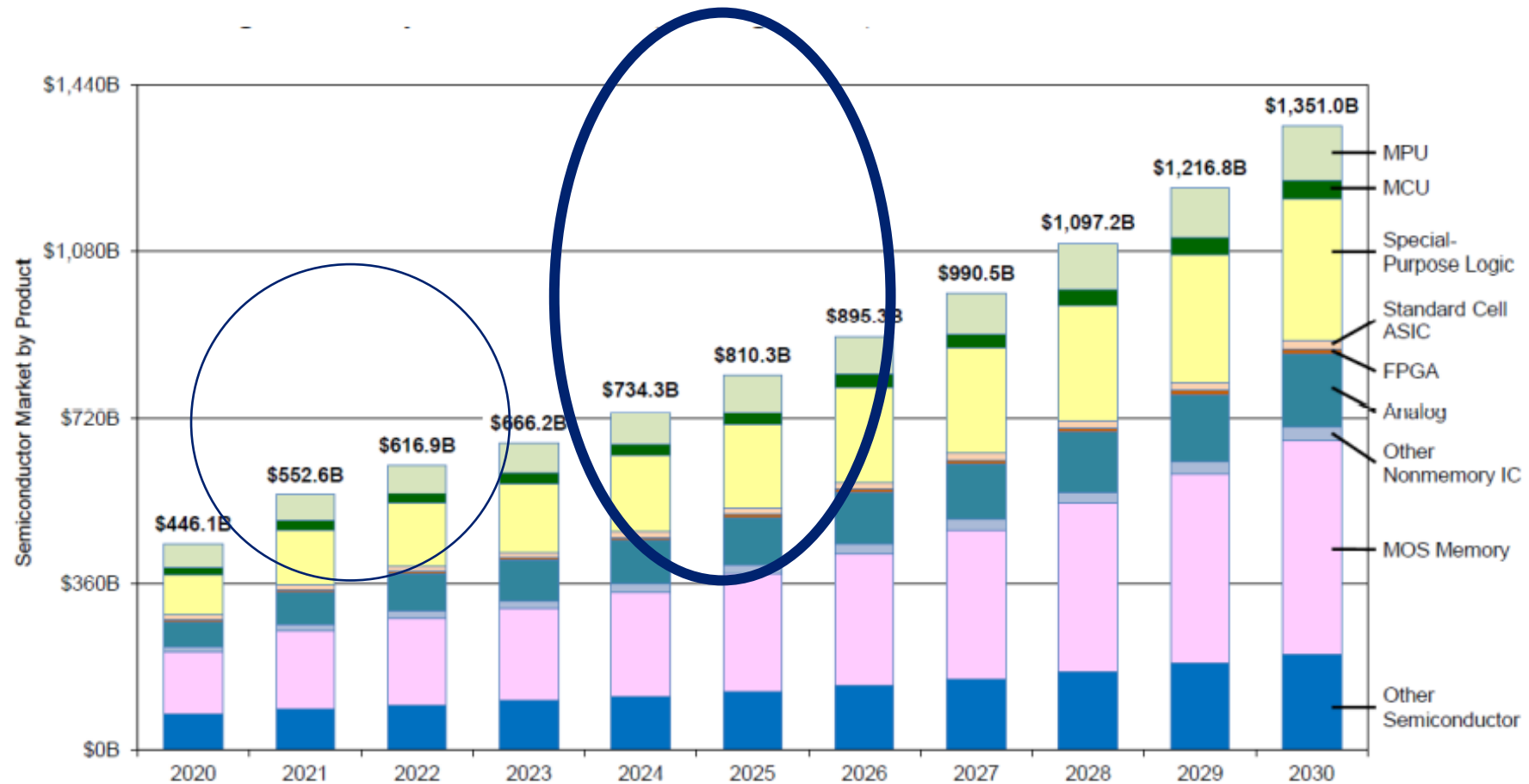


Figure 11. Semiconductors market forecast by product type (IBS 2022)

EU Market share in the Chips Supply Chain

# Sustainability arguments for SEMICONDUCTORS

Design, manufacturing, use, repair, reuse, and recycling



## Novel Materials

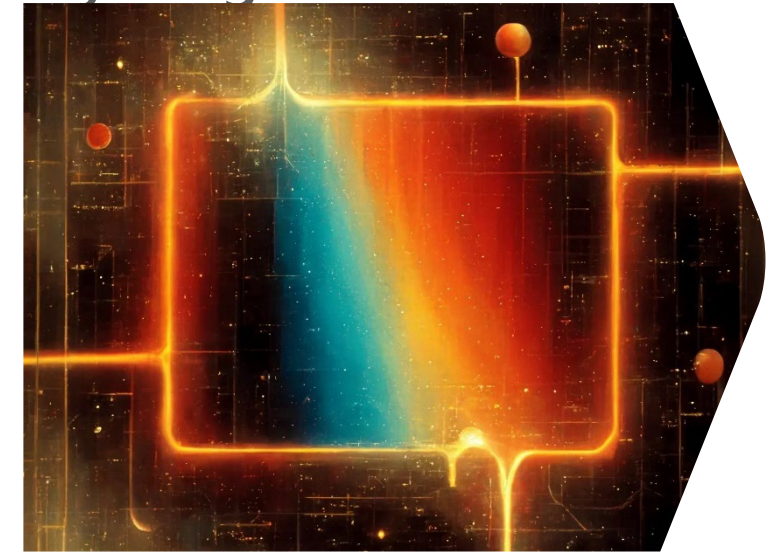
From fossil based to Bio/based, biodegradable, abundant, etc..



## Manufacturing changes:

Novel processes. From etching-based to additive

Others reducing the energy or water consumption and avoiding the use of certain chemicals



## Hybrid Integration

Packaging or Interconnections for easy recyclability or reuse

## (Design) radically new devices

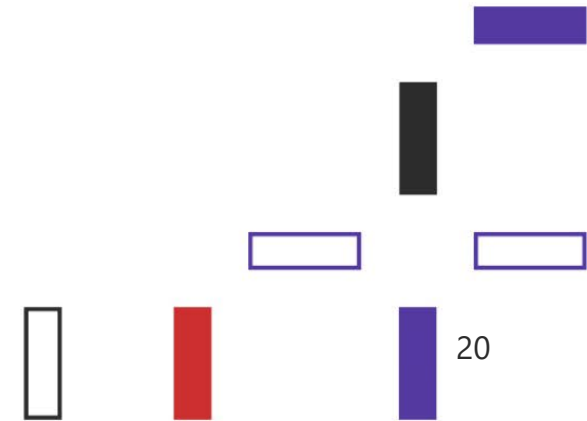
Sensors or lighting devices inspired by nature

# Background – More Important Info



	Aerospace/ defence	Textiles	Electronics
Antimony	✓	✓	
Baryte			
Bauxite	✓	✓	✓
Beryllium	✓		✓
Bismuth	✓		✓
Borate	✓		✓
Cobalt	✓	✓	✓
Coking coal			
Fluorspar			
Gallium	✓		✓
Germanium	✓		✓
Hafnium	✓		✓
Indium	✓		✓
Lithium	✓		✓
Magnesium	✓		✓
Natural graphite	✓		✓
Natural Rubber	✓	✓	
Niobium	✓		✓
Phosphate rock			
Phosphorus	✓		
Scandium	✓		
Silicon metal	✓	✓	✓
Strontium	✓		✓
Tantalum	✓		✓
Titanium	✓		✓
Tungsten	✓		✓
Vanadium	✓		
PGM	✓		✓
HREE	✓		✓
LREE	✓		✓

- EU Circular Economy Action Plan [Circular Economy Action Plan | Subject files | Home | ENVI | Committees | European Parliament \(europa.eu\)](#)
- Critical raw materials resilience [EUR-Lex - 52020DC0474 - EN - EUR-Lex \(europa.eu\)](#)
- Framework for 'safe and sustainable by design' chemicals and materials <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022H2510>



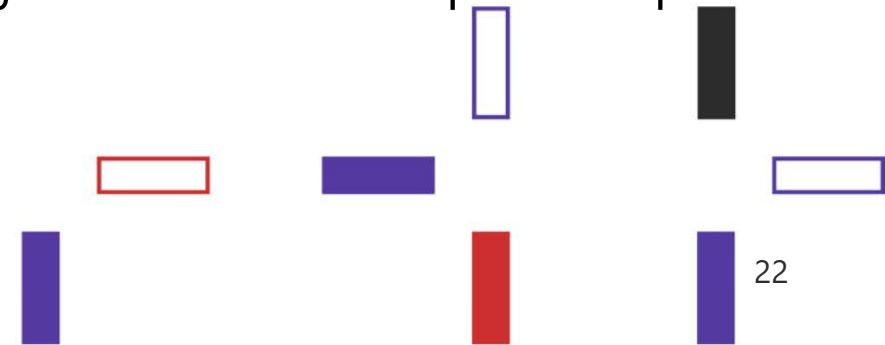
# RESPONSIBLE ELECTRONICS



## • EIC Pathfinder Challenge: Responsible Electronics

### Background and Scope

- Opportunity for the future of EU industrial autonomy in a decarbonised and digital society
- Contributing to drastically reduce the environmental load of the electronic industry by shifting from traditional manufacturing industrial methods to innovative methods and materials with a lower environmental impact.
- Contributing to overcome the current chips crisis by:
  - reducing the dependency on critical raw materials and traditional high energy demanding semiconductor processes
  - Upholding the EU technology sovereignty, contributing to the objectives of the European Chips Act.





## Overall goal and specific objectives

- The overall goal of this Challenge is to create opportunities for discovery of new environmentally friendly electronic materials, thus reducing its environmental impact and the need for critical raw materials and hazardous chemicals .
- Projects supported under this Challenge are expected to offer:
  - materials with improved properties (such as flexibility, durability, end of life recyclability/reusability),
  - materials processed with low energy consumption and low carbon footprint processing (such as printing instead of photolithography, avoiding use of fluorinated gases for patterning),
  - or alternatives, including nano-sized ones, to replace common electronic materials such as silicon and silicon nitride.



The **specific objectives** of this Challenge are to support the scientific community in reaching breakthroughs in development/discovery of:

- ★ Advanced electronic materials for unconventional devices :
  - small-molecule and polymeric organic materials,
  - solution-processable inorganic materials,
  - hybrid organic-inorganic materials,
  - polymer-matrix nano-composite materials,
  - bio-based and nature-inspired materials
  - for the manufacturing of n- and p-semiconductors, dielectrics, conductors, including transparent conductors, particularly those suitable to make functional inks, passivation/encapsulation/packaging materials, flexible/stretchable substrates, etc.



# Responsible Electronics



The **specific objectives** of this Challenge are to support the scientific community in reaching breakthroughs in development/discovery of:

✦ Advanced processes:

- production methods based on solution processing such as blade coating, slot die coating, spray coating, screen printing, inkjet printing, offset, gravure and flexo-printing, or
- other techniques particularly suitable for sheet-to-sheet or roll-to-roll manufacturing.

✦ Unconventional applications including e-textile/e-skin:

- backplane and logic circuits,
- microprocessors (4-8 bits),
- sensors,
- displays,
- power supplies,
- wireless transmitters/receivers, etc.

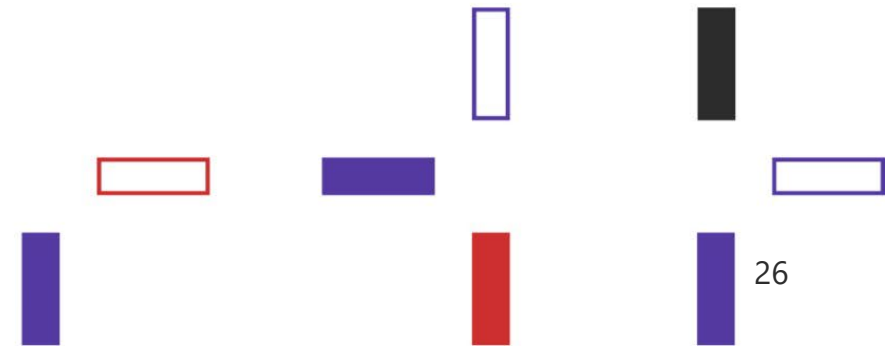
particularly those suitable for Internet-of-Thing (IoT) applications while applying the life-cycle thinking approach





## Expected outcomes and impacts

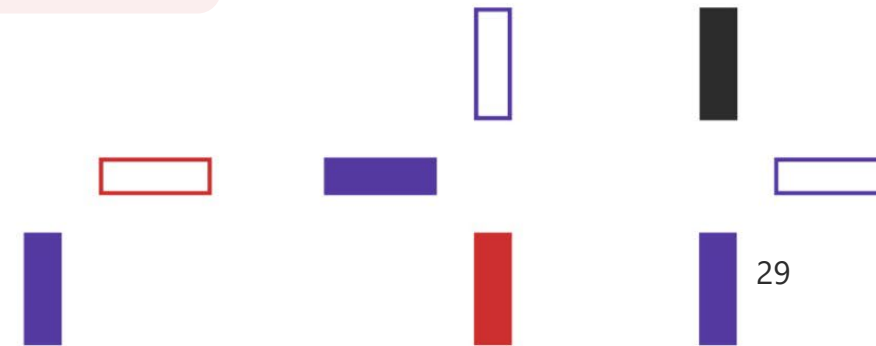
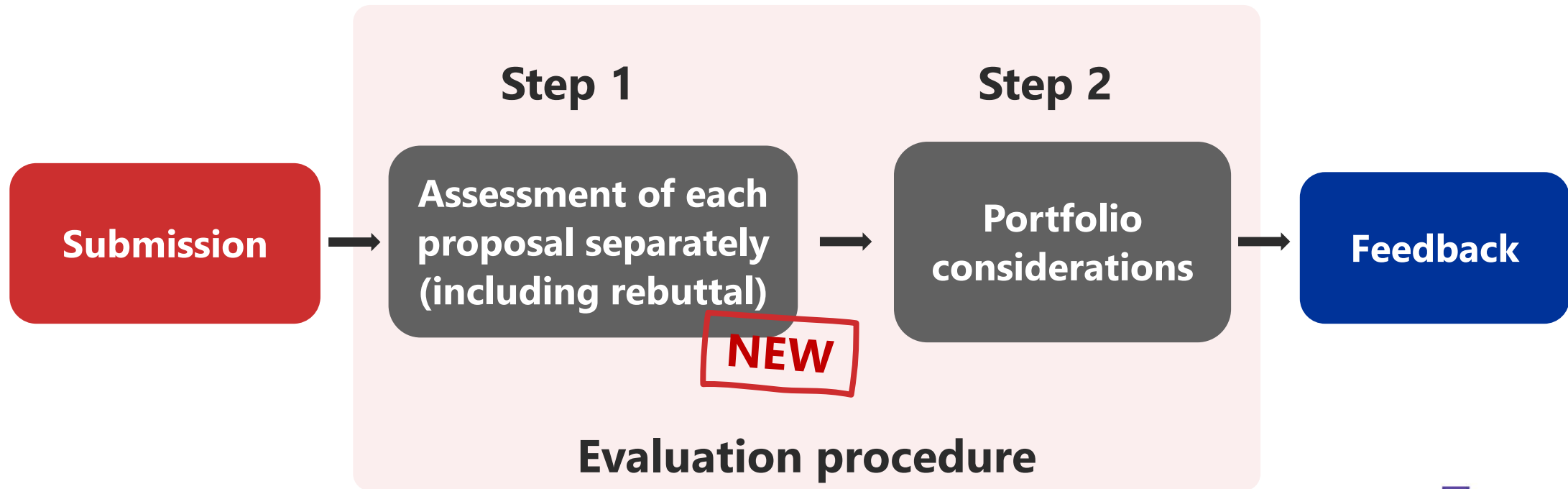
- This Challenge is expected to contribute to the development of materials with new properties or replacing materials used in current electronic devices with materials, which:
  - ✦ reduce dependency on critical raw materials,
  - ✦ are sustainable: having a low environmental footprint and developed recurring to the life cycle thinking approach.
- The overall outcome of this Challenge is to support the move from traditional materials and manufacturing processes to less environmental impactful ones. It is expected that the Challenge will lead to the development of **lab-scale validated proof of concept devices based on the developed innovative materials and manufacturing processes**, which may represent a potential application of a more sustainable, trusted and secure electronics.



- **Specific conditions**
- Projects with **multidisciplinary and cross-sectorial approaches**, looking for inspiration, ideas and knowledge in a broad range of disciplines are particularly welcome.
- The safe and sustainable use of non-critical raw materials or the full recycle/reuse of them is mandatory. **All projects are expected to conduct a full life cycle analysis of the proposed solutions and they shall apply or identify a methodology to measure the environmental and/or carbon footprint of the proof of principle/s that will be developed during the project.**
- Applicants should ensure that the proposed method/technology/material/s is not harmful to the natural ecosystems. **Packaging and durability should be taken into consideration.**

**EIC Pathfinder  
Evaluation and Portfolio  
considerations  
Responsible Electronics**

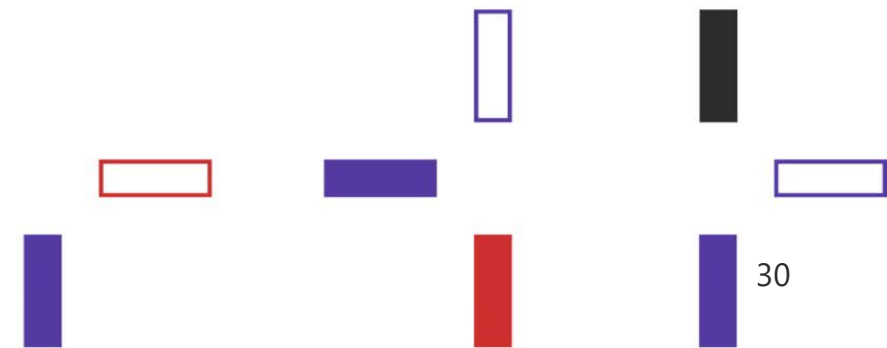
# How does the EIC decide if your proposal will be funded?





## Award criteria Pathfinder Challenge (and Open)

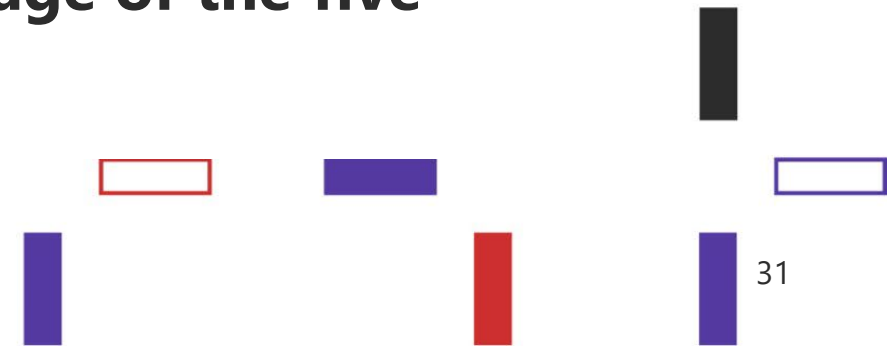
- Excellence (threshold 4/5, weight 60%)
- Impact (threshold 3.5/5, weight 20%)
- Quality implementation (threshold 3/5, weight 20%)



# Step 2: Portfolio considerations



- All proposals that meet the thresholds defined in the award criteria will be considered in step 2
- **Mapping of proposals in 5 categories** stemming from overall goal and specific objectives of the Challenge (e.g., building blocks or subsystems, technical areas and/or competing technologies, platforms, applications areas, risk level and stage of technology readiness level, size)
- Starting from the highest ranked proposal, a portfolio of proposals will be selected based on **shared components/complementarities, while ensuring diversity among the selected proposals and coverage of the five categories.**

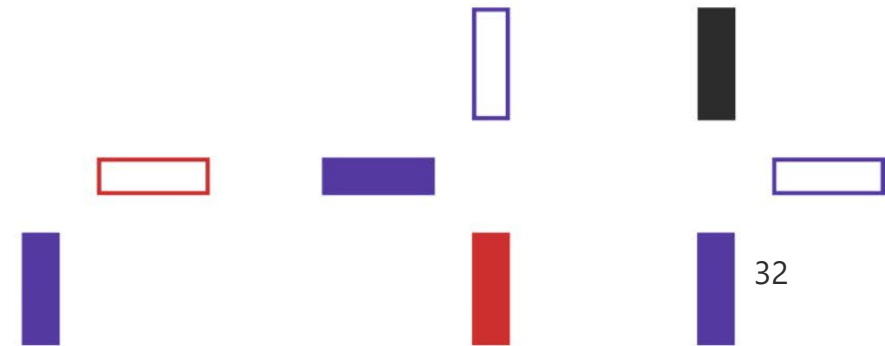


# Step 2: portfolio considerations



The Challenge Guide for Responsible Electronics  
Pathfinder Challenge describes the Portfolio  
Considerations:

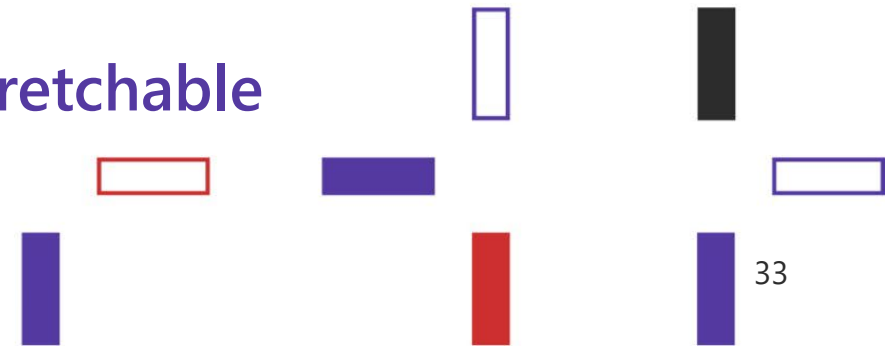
[Challenge Guide 2023 Responsible Electronics-  
final.pdf \(europa.eu\)](#)



# Portfolio considerations: Categories



1. Organic small molecule and/or polymeric materials
2. Solution or vapor processable inorganic materials
3. Hybrid organic-inorganic materials and/or nanocomposites
4. Nature inspired solutions
5. Other radically new materials or processes for Electronic Devices particularly those suitable for functional inks, passivation/encapsulation/packaging and/or flexible/stretchable substrates







## Devices

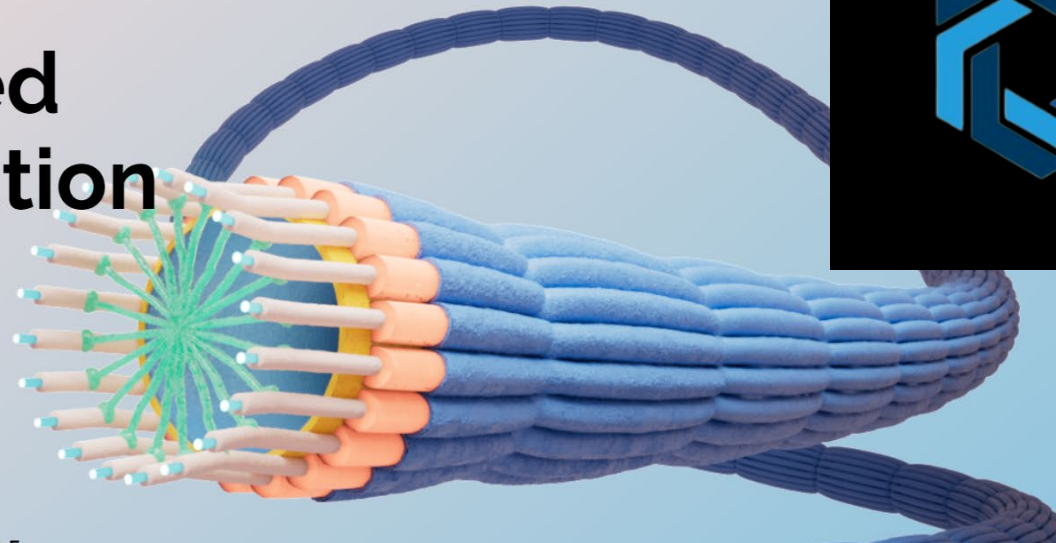
- Novel discrete analog components especially those for power devices
- Optoelectronic devices
- Sensors and Actuators (with at least the following sub-categories: chemical, mechanical, temperature, physiological and biosensing)
- Displays and illumination solutions
- Logic circuits, microprocessors and memories
- Wireless transmitters/receivers and other devices for Communication
- ..

## Technological approach

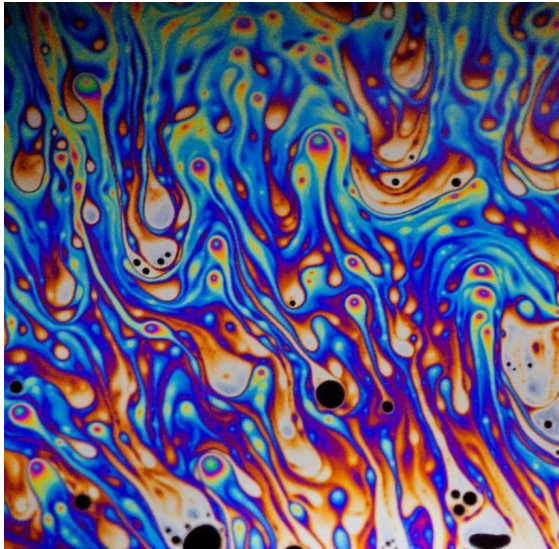
- Printing techniques for flexible devices: Inkjet, aerosoljet, etc..
- Solution-based coating techniques: slot-die, spray-coating, blade-coating dip-coating, etc..
- 3D printing
- Vapor or other energy-efficient source based processes
- Low-energy low-carbon emission patterning: adhesion lithography
- ...

# Protein-Based Next-Generation Electronics

Our ambitious EIC PathFinder project aims to realize breakthroughs with cable bacteria and their highly-conductive proteins for next-generation bio-electronics applications.



PRiNGLE is a four-year international project to design a new class of protein materials with tuned electronic properties, investigate and develop integration of these materials into electronics.



Our mission is to design...

## ***Our Offered Solution through Responsible Research and Innovation:***

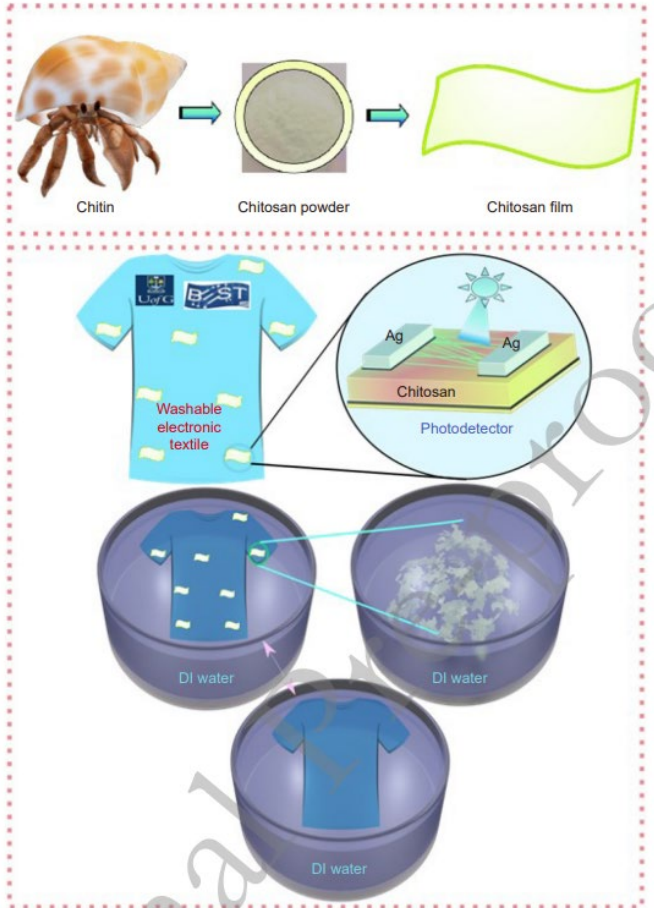
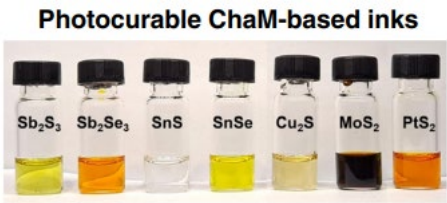
*Within a century of fascinating progress in electronics, viable proton-based devices are yet to be developed, although nature has given us efficient and intrinsically sustainable biological systems that are fundamentally protonic.*

*Taking a cue from recent advances in organic electronic and protonic devices, we target a radical, foundational and sustainable breakthrough in device & sensor innovation, using designer soap films.*



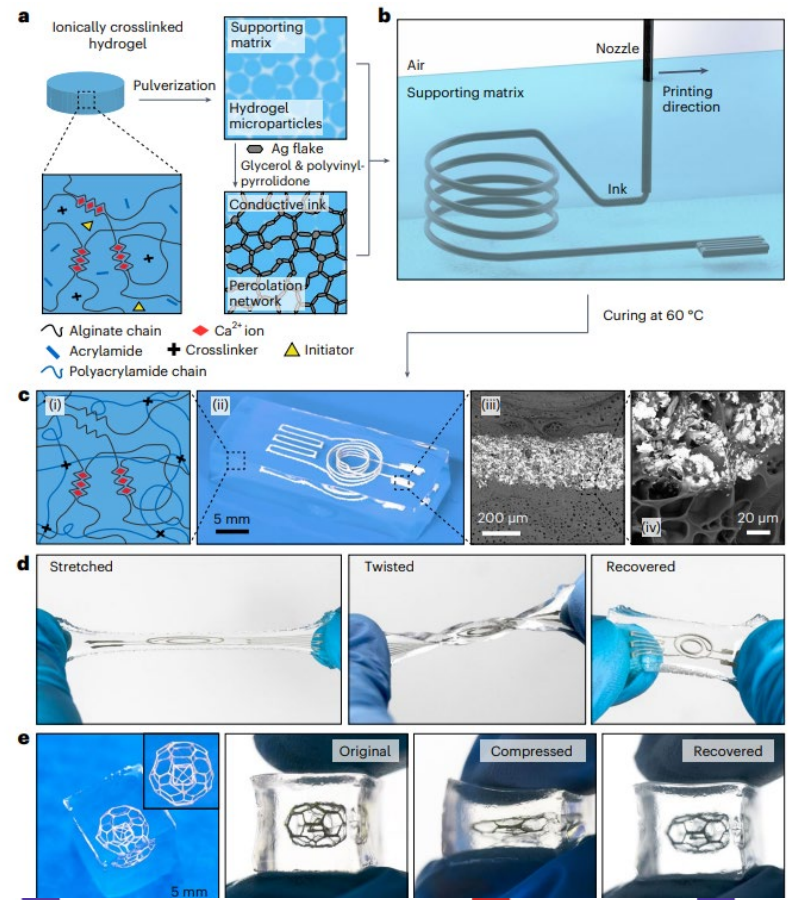


## Generalised optical printing of photocurable metal chalcogenides Nature Communications | (2022) 13:5262



ZnO nanowires based  
degradable high-  
performance  
photodetectors for eco-  
friendly green  
electronics Opto-  
Electron Adv 6, 220020  
(2023)

## Three-dimensional printing of soft hydrogel electronics Nature Electronics | Volume 5 | December 2022 | 893–903



# Challenge Strategy plan

This Challenge aims at:

- **Enhancing the opportunities of the new environmentally friendly electronic materials potential or novel processes** of the portfolio individual project: *Ensuring that portfolio members can access a much higher number of relevant applications/devices to explore key partnerships*
- **Enhancing the commercialisation potential of the portfolio individual project:** *Ensuring that portfolio members can access the right industry partners to explore key partnerships*

 **Strategy plan for the Responsible electronics portfolio**







## Non-exhaustive examples of activities:

- Contributing to understand better/improve the current regulatory framework
- Effectively communicate of any key outcome of the research work of the portfolio members collectively and/or an individual project, to early stage private and corporate investors focused on the same field. Such communication might also be addressed to the general public to increase social acceptance for proposed solutions, or to other researchers and stakeholders through common dissemination activities at scientific conferences or trade-fairs.
- Market analysis: Map the targeted players in a market and exchange the market research analysis results with other the portfolio projects to identify specific players with which the entire portfolio can establish partnership(s) of much higher impact as opposed to that of the individual project.
- Discussions on IP, licensing and business models and commercialisation strategy
- Providing access to Open Innovation Test Beds and other research infrastructure
- Standardisation activities
- Providing access to new markets through multipliers like Enterprise Europe Network

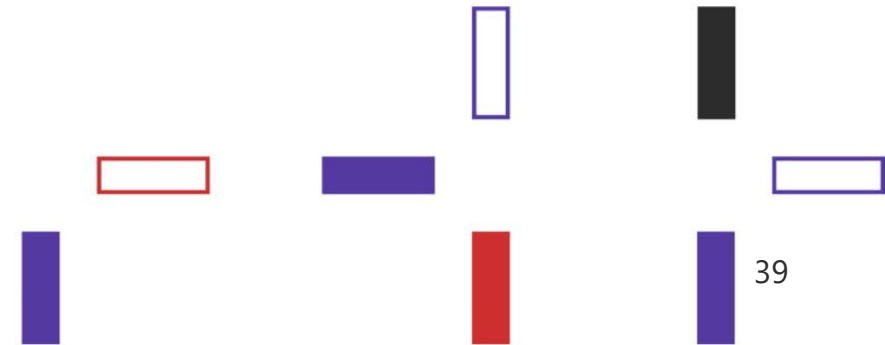
**RECOMMENDATION:** add a dedicated WP for portfolio activities with at least **10 PMs**





Join at **Sli.do**

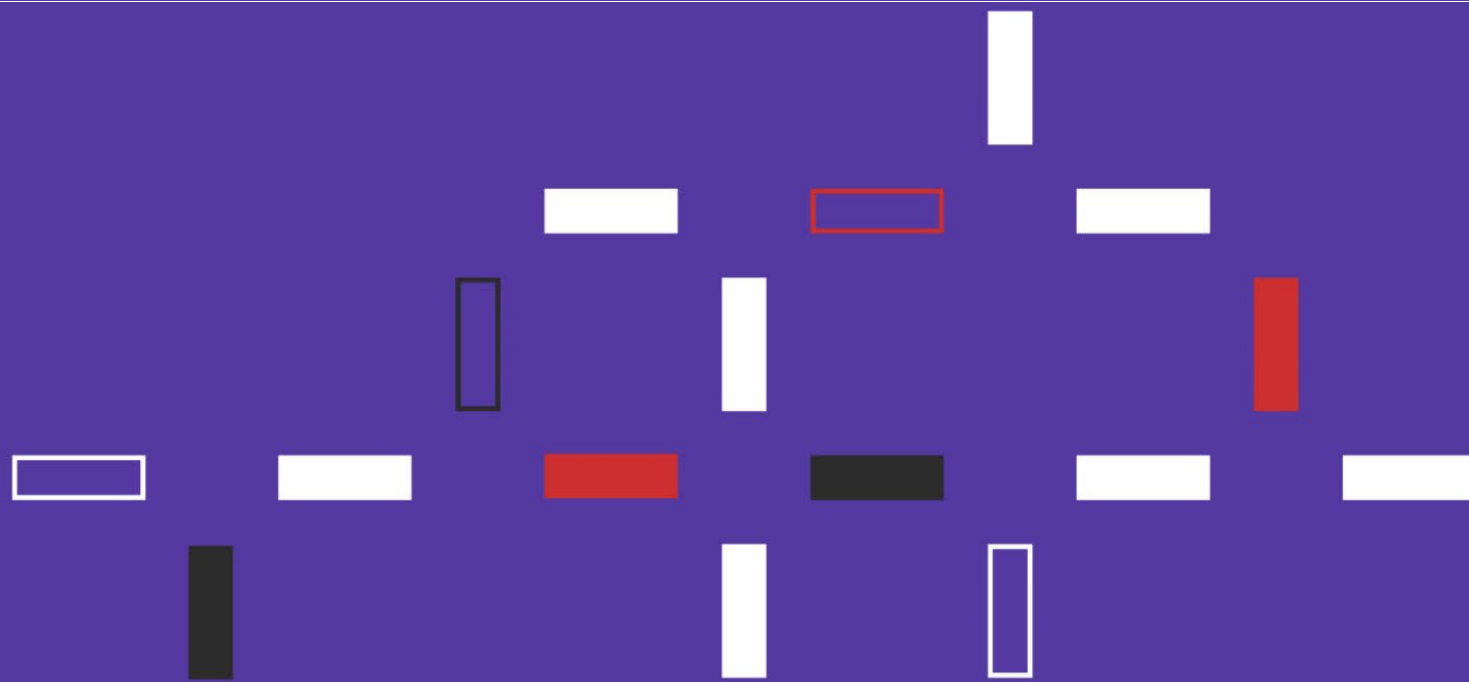
With the event code  
**#Challenges**





# Q&A

Isabel Obieta  
Dalibor Grgec

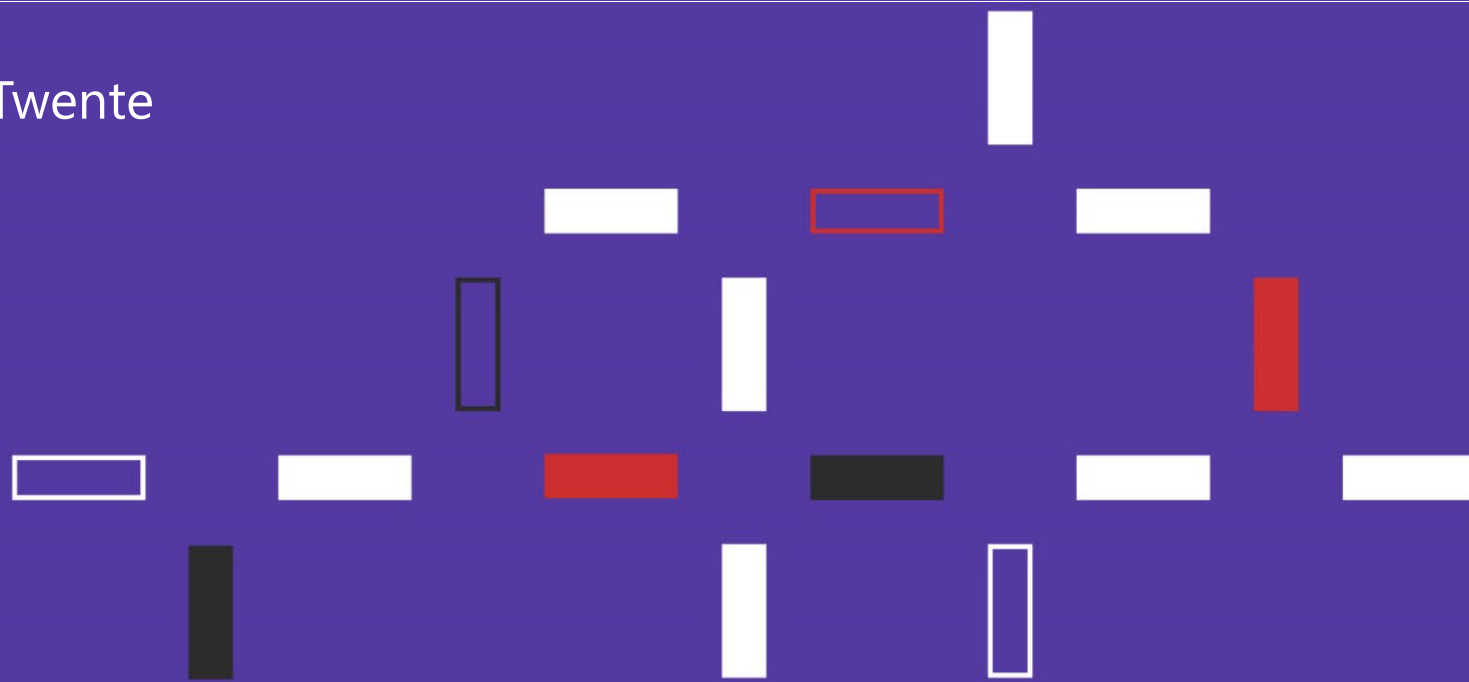




# Short pitches

## Participants

- Silicon Nanoparticles / University of Twente
- Karlsruhe Institute of Technology
- Get Greener / Normandy Coating
- IrrevoChrom / University of Vienna
- AlmaScience





# Useful links to the EIC Work Programme 2023:

## EIC Work Programme 2023:

(the legal basis)



## Recording of EIC Info-day 13 December:

(not repeated today)



Questions: contact your National Contact Point

National Contact Points for Horizon Europe:  
(NCP Portal)





# Thank you!

[www.eic.ec.europa.eu](http://www.eic.ec.europa.eu)

@EUeic

#Eueic

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