



International Cooperation On Semiconductors

SIE Meeting, Noto, Sept. 8, 2023

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INTRODUCTION

- ICOS Project starts in January 2023 for three years, it is funded by the Horizon Europe research program.

Coordinator



Technical co-Coordinator



- An ambitious project in the framework of the European strategy for semiconductors

PARTNERS & ADVISORY BOARDS

PARTNERS

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RTOS



INDUSTRIAL ADVISORY BOARD



ASSOCIATIONS & CONSULTING COMPANIES



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Semiconductors & Semiconductor-based photonics are pivotal technologies for almost all existing industrial sectors, as demonstrated by the recent chips shortages.

In particular, semiconductors are essential enablers for **digital and green transitions** and for SDGs.

OBJECTIVES

- **International cooperation** is key for speeding up technological innovation (e.g. ITRS/IRDS, IPSR-I)
- To build **balanced semiconductor partnerships** with like-minded countries
- To set out cooperative framework on *initiatives of mutual interest*
- To identify and support the establishment of the **most promising scientific international collaborations**
- To support the growth of the European Semiconductor industry through **focused research alliances** based on awareness of advanced research activities
- To strengthen **Europe's position** in global value chains in this area

A brief history of semiconductor technology

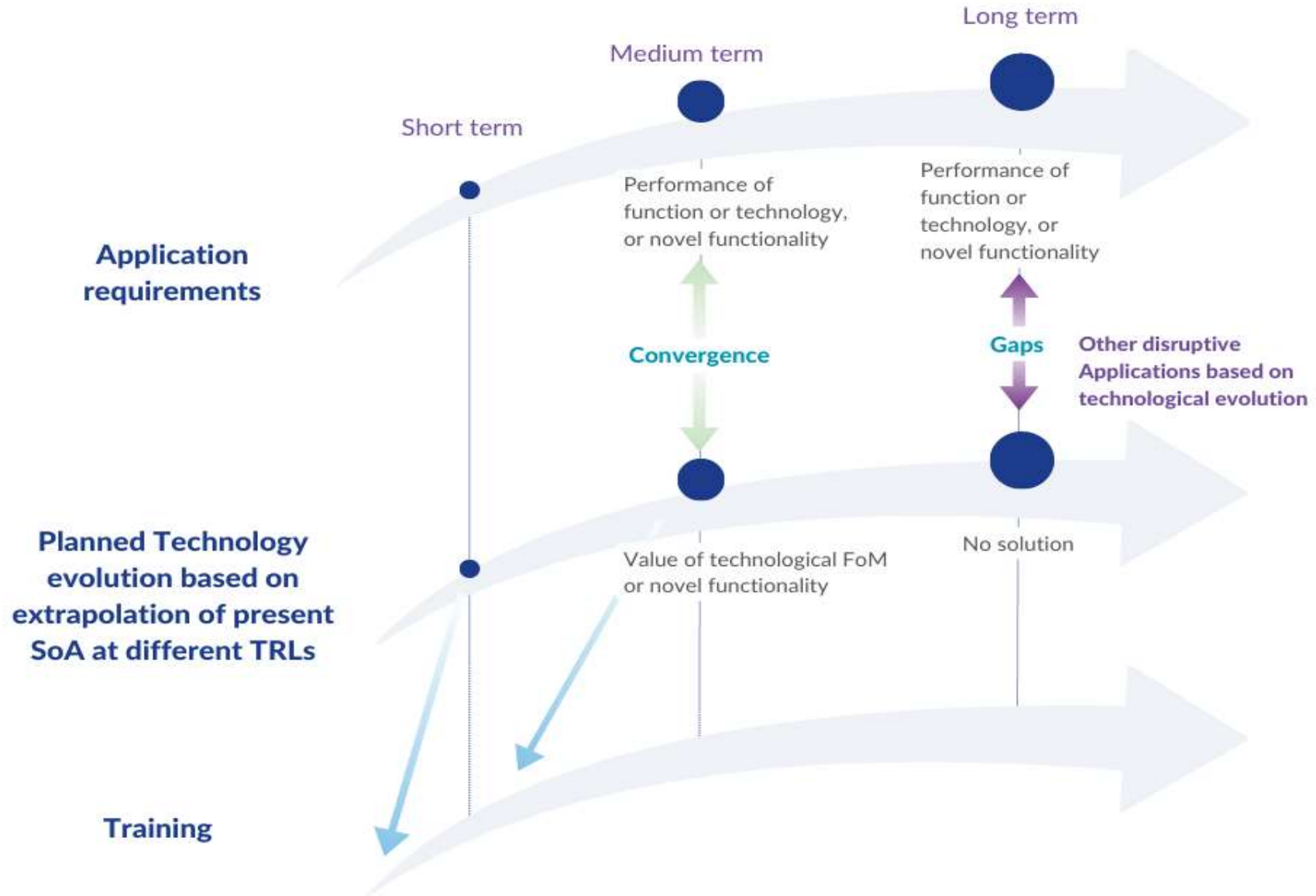
75th anniversary of the transistor

- *Point-contact transistor* by J. Bardeen and W. Brattain in Dec. 1947 (Ge)
- *Bipolar junction transistor* by W. Shockley in Jan. 1948
- *First Si Transistor* in 1958 (TI)
- *Integrated Circuit* in 1958 (J. Kilby)
- *MOS Transistor* by D. Kahng and M. Atalla in 1960 (Si)
- *Microprocessor* in 1971 (Intel)
- *>1B Transistors per die* beginning 21st century
- *Novel materials/device architectures: High k, Multi-gates, etc.*

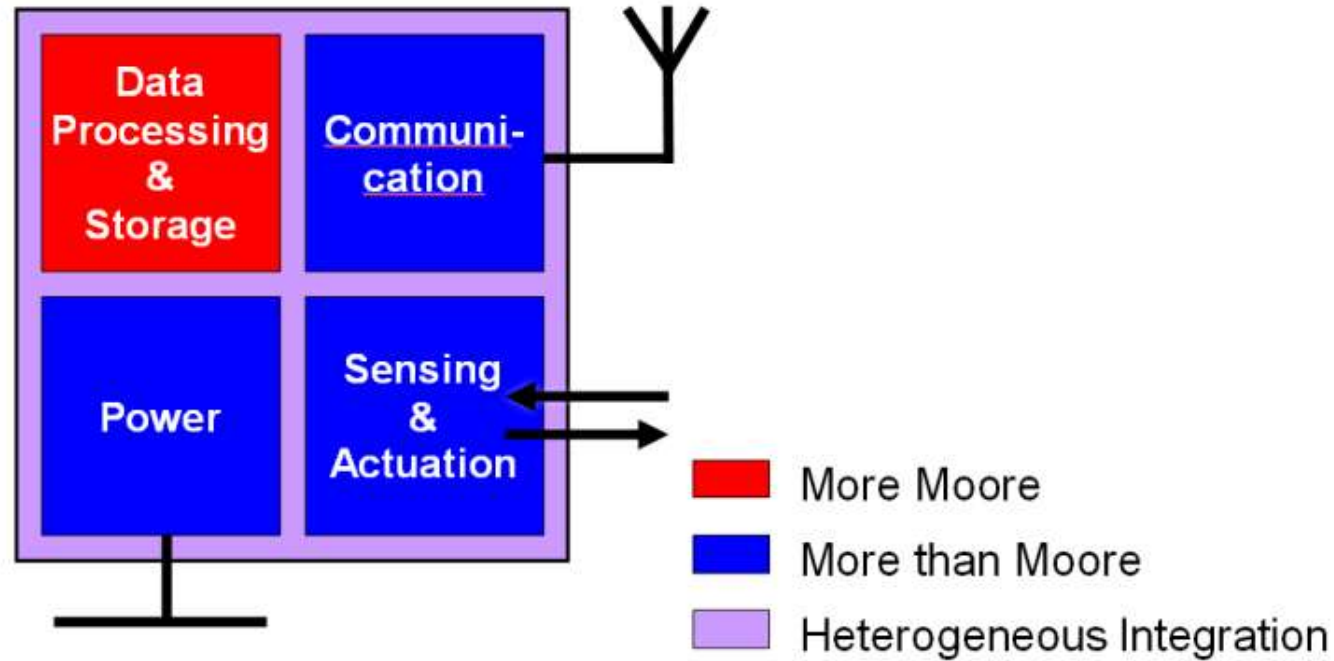


=> **Many innovations accelerated by international collaborations**

International cooperation in Roadmaps: NEREID/IRDS & Training



MAIN SCIENTIFIC TOPICS



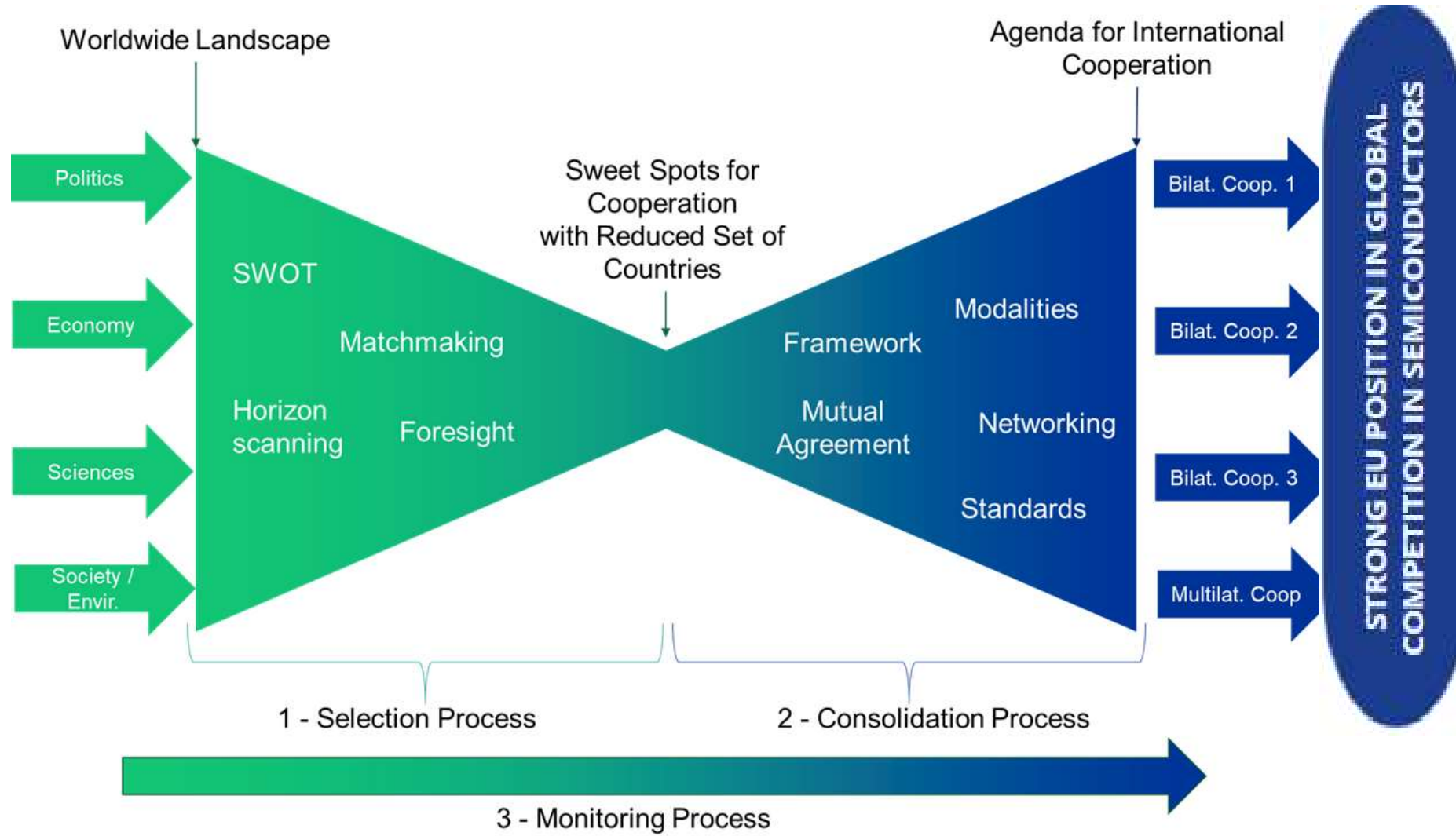
- Advanced computing & Advanced functionalities : sensing, RF & optical communications, optical devices, energy harvesting, power devices...

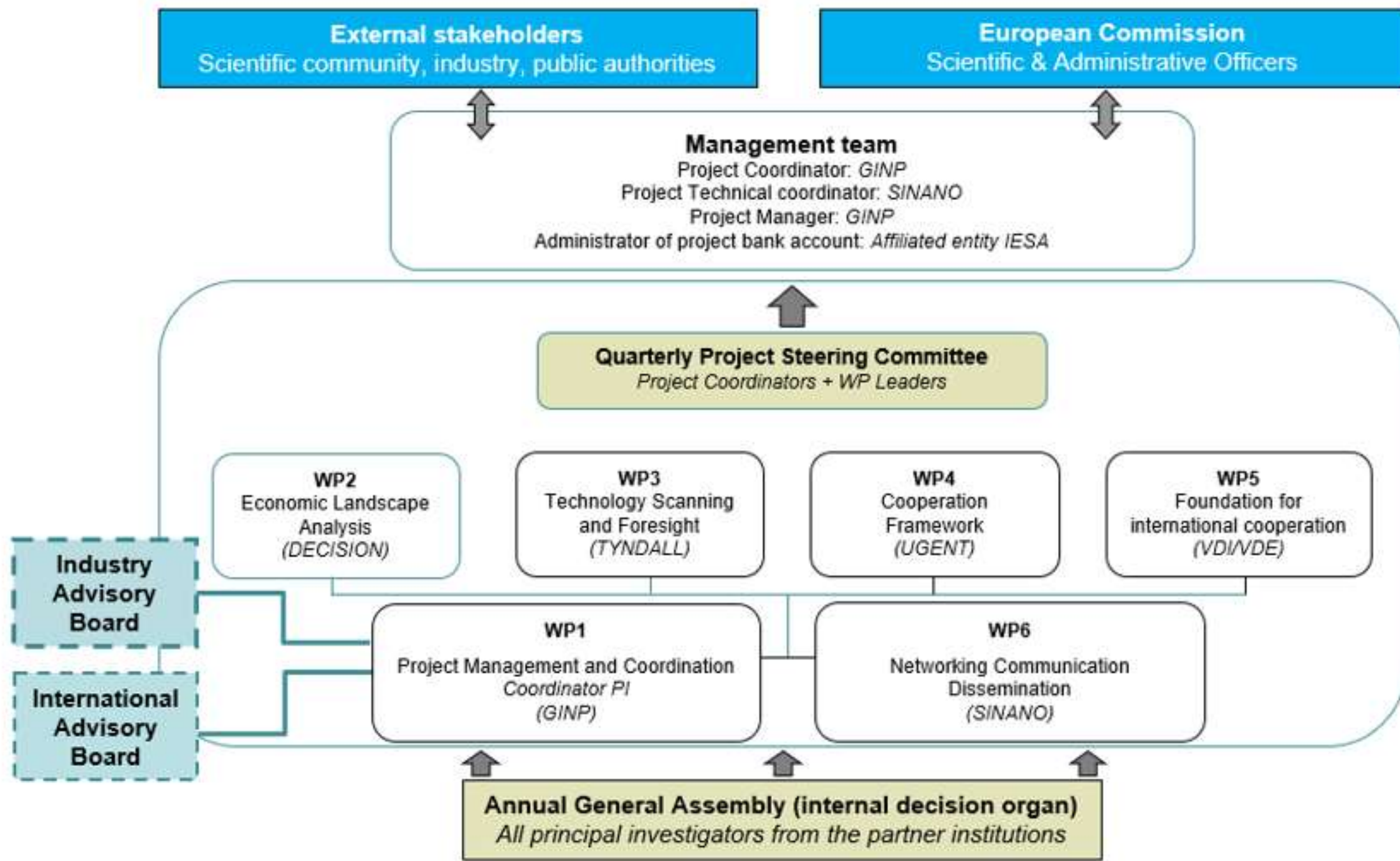
TAKING INTO ACCOUNT TECHNOLOGY SUSTAINABILITY, IN LINE WITH THE GREEN DEAL

ESH/S IFT Team Structure



CONCEPT





Structure of ICOS project & stakeholders

IMPLEMENTATION

IMPLEMENTATION

EXHAUSTIVE ANALYSIS OF SEMICONDUCTORS' VALUE CHAINS, FOR ELECTRONICS & PHOTONICS

Identification of :

- EU's economic and industrial strengths & weaknesses
- Strategic dependencies
- Market and cooperation opportunities

IDENTIFICATION OF RESEARCH AREAS FOR INTERNATIONAL COOPERATION

Identification of next generation & emerging technologies, especially in advanced computation and functionalities.

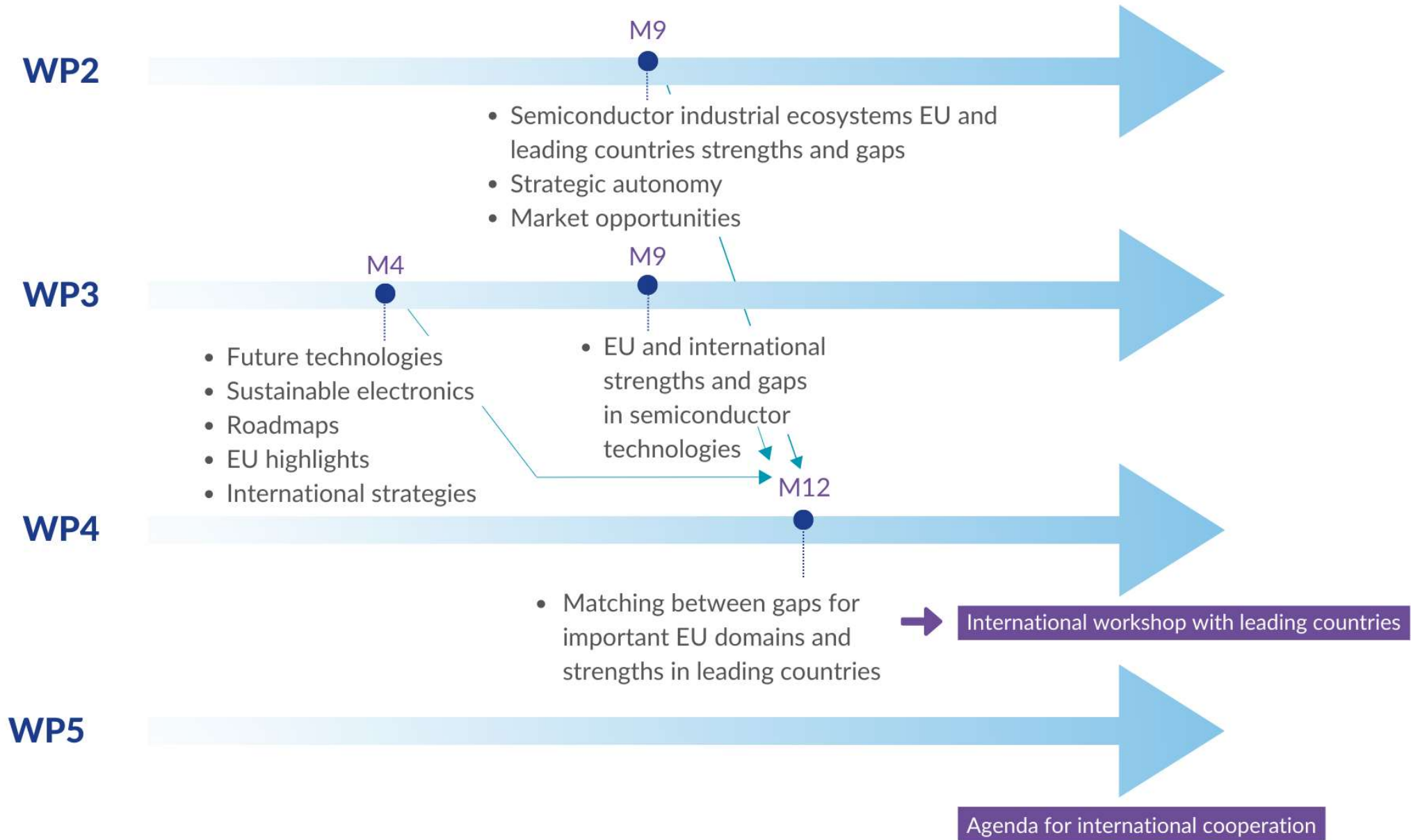
DETERMINATION OF MOST INTERESTING COUNTRIES FOR INTERNATIONAL COOPERATION

Identification of challenges for which international cooperation is critically important.

AGENDA FOR AND INITIATION OF INTERNATIONAL COOPERATIONS

- Dialogue with actors of existing cooperation
- International collaboration with non-EU national authorities
- Define standardisation needs and activities
- Support the European Commission

ICOS 1st Year at a glance



OUTCOME & IMPACT

OUTCOME & IMPACT

- **Raise awareness of the advanced research activities** inside and outside Europe
- **Reduction of the gaps & Increase European Leadership** in Semiconductor & Semiconductor-based photonics
- **Facilitate the European industry in the realization of emerging technologies:** advanced computation & advanced functionalities
- **Reinforce the position of the European industry** through new standards
- **Contribute to the European Strategic Autonomy** through balanced partnership with like-minded leading countries
- Contribute to other European initiatives in this sector : **European Chips Act & Digital Agenda.**
- **Contribute to the realization of the Green Deal:**
 - Digitalisation of many domains to reduce footprint
 - Electronics monitoring targeting societal challenges (energy, health, environment, etc.)
 - Sustainable electronics (energy consumption, critical materials, etc)



1st Workshop

1st ICOS workshop “Sustainable Electronics and International Cooperation On Semiconductors” organized with the SiNANO Institute on April 26-28th in Grenoble



Presentations available on the ICOS website:

<https://icos-semiconductors.eu/workshop-sustainable-electronics-international-cooperation-on-semiconductors/>

ICOS general presentation

- CHIPS ACTS and strategies (EU, USA, Japan)
- IRDS Roadmaps
- Advanced Functionalities (Smart Sensors & Smart Energy)
- Semiconductors-based Photonics
- Advanced Computing
- Beyond CMOS
- Quantum Information Processing
- Sustainable Electronics
- Strategy for International Cooperation
- Japan-EU Session*

2nd ICOS workshop “European Strengths and Gaps in Emerging Semiconductor Technologies” jointly organized with the SiNANO Institute on Sept.11th in Lisbon



SiNANO/ICOS WORKSHOP



Main objectives of this Workshop :

- Review of the main EU & non-EU semiconductor ecosystems
- Review of the main EU & International activities and most promising technologies in the field of Advanced Computing and Functionalities.

These reviews will allow to **highlight the strengths of the main leading Institutions in each country** (Universities, RTO, Industry) in each technological area

ICOS general presentation

2nd Workshop: program

SINANO-ICOS Workshop on "European strenghts and gaps in emerging semiconductor technologies"	
Topic	Speaker
1. Horizon Europe ICOS-International Cooperation On Semiconductors	<ul style="list-style-type: none"> Francis Balestra, CNRS/Grenoble INP
2. Review of the EU and main non-EU semiconductor Ecosystems	<ul style="list-style-type: none"> Léo Saint-Martin, Decision
3. Advanced computation: review of main EU and international activities and technologies	<ul style="list-style-type: none"> Olivier Faynot, LETI
4. Smart Sensors: review of main EU and International activities and technologies	<ul style="list-style-type: none"> Alan O'Riordan, Tyndall
5. Smart Energy: review of main EU and international activities and technologies	<ul style="list-style-type: none"> Markus Pfeffer, FhG
6. Energy Harvesting: review of main EU and international activities and technologies	<ul style="list-style-type: none"> Gustavo Ardila, Univ. Grenoble-Alpes
7. Semiconductor-based Photonics: review of main EU and international activities and technologies	<ul style="list-style-type: none"> Roel Baets, Univ. Ghent/EpiXFab

- 2024: General ICOS Workshops:
 - Munich
 - Athens
- 2024: Bilateral Workshops:
 - EU-South Korea
 - Other possible Workshops: Japan, etc.

Thank you for your attention

Contact for questions and participation:

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www.icos-semiconductors.eu