

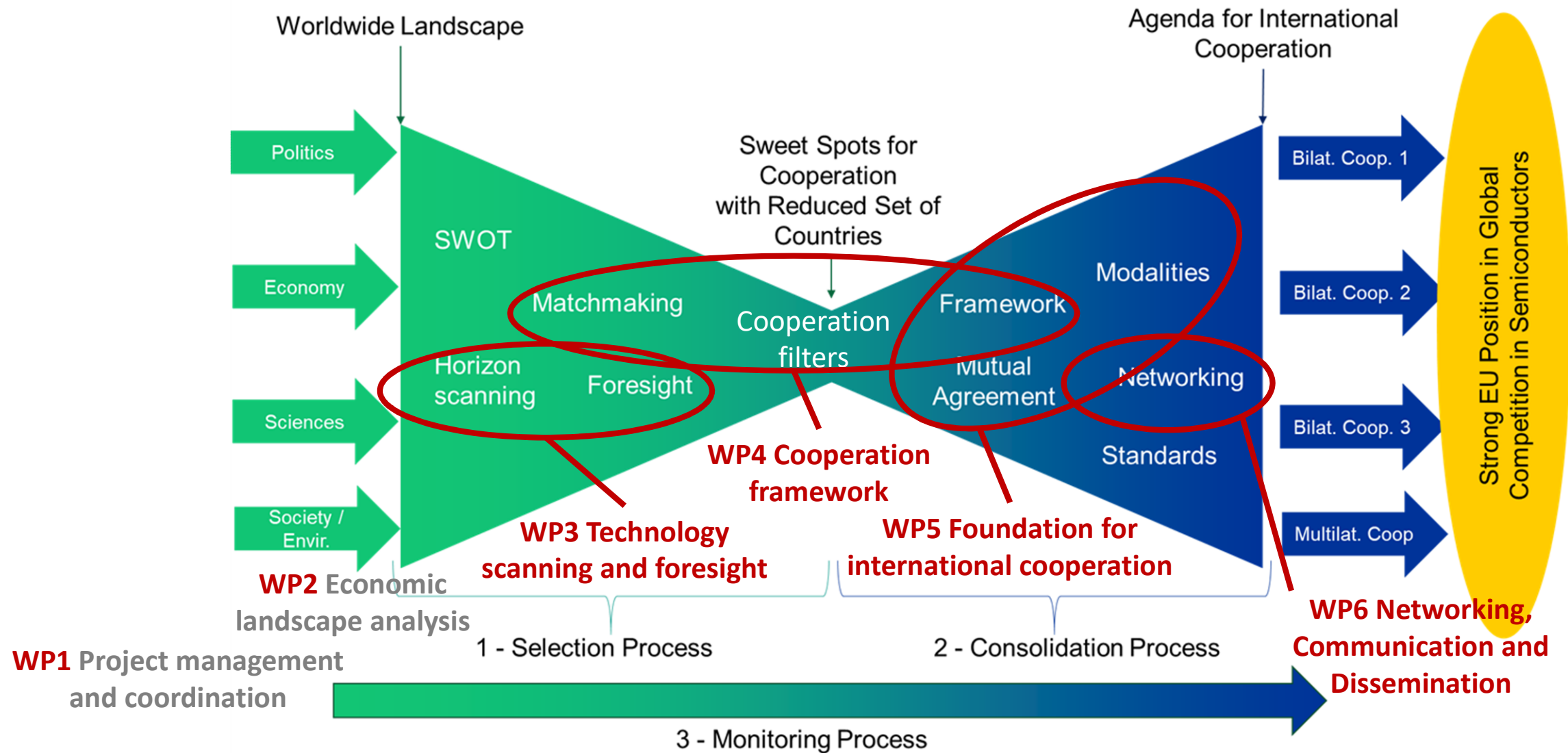


The Role of Italy

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IU.NET and University of Bologna

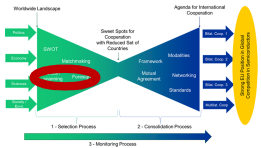
OVERALL METHODOLOGY & IU.NET INVOLVEMENT



WORKPACKAGES STATUS

WP1 — Project Management and Coordination	In progress
WP2 — Economic Landscape analysis	In progress
WP3 — Technology scanning and foresight	<ul style="list-style-type: none"> • T3.1: In progress, monthly meetings • T3.2: In progress, monthly meetings • T3.3: In progress, monthly meetings • T3.4: Not yet started
WP4 — Cooperation framework	<ul style="list-style-type: none"> • T4.1: In progress (monthly meetings since September) • T4.2: Starting soon (monthly meetings since September) • T4.3: Starting soon (monthly meetings since September) • T4.4: In progress
WP5 — Foundation for international cooperation	<ul style="list-style-type: none"> • T5.1: Starting soon (monthly meetings since September) • T5.2: Starting soon (monthly meetings since September) • T5.3: Not yet started • T5.4: Not yet started
WP6 — Networking, Communication and Dissemination	In progress

Coordination action: Research areas and future technologies for international cooperation



- Future Technologies in Advanced Computation (T3.1) and for Advanced Functionalities (T3.2):
 - Review EU, non-EU, international roadmaps.
 - Catalogue next-generation and emerging technologies.
 - Assess the impact of future technologies: filtration and prioritization.
- **T3.3 Recommendations for International Research Cooperation (task leader)**
 - Quantitative assessment of strengths/weaknesses in mapped technologies.
 - Recommendations on technological research topics.
- Update on Technology Scanning and Foresight (T3.4)
 - Complement quantitative assessment for newly emerged paradigms.

RESEARCH AREAS UNDER DISCUSSION AND FUTURE TECHNOLOGIES FOR INTERNATIONAL COOPERATION

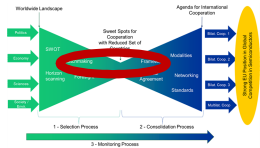
Magnetic Materials	Flexible/Stretchable Electronics	Fine-Pitch RDL
Ferroelectric Materials	Edge/Fog Computing	Superconducting Logic/Josephson Junctions
Multiferroic Materials	Ultra-Low-Power Protocols for Long-Range Communication	Integrated III-V Lasers for Photonics Applications
Semiconducting Oxides	Architectures for System Validation & Maintenance	Co-Packaged Optics
2D Materials	CFET	Si Interposer or Si Bridge incl. RF Applications
Oxide-Based Memory	Nanosheets	Glass Interposer
Ferroelectric Memory	FinFET	Sustainability
Magnetic Micro- Inductors and Transformers	FDSOI	Advanced PCB
Piezoelectric MEMS	Steep Slope Devices	Neuromorphic Architectures
Atomic Layer Etching (ALE)	Compound Semiconductors for RF	Quantum Computing Chips
Micro Transfer Printing	BEOL Materials and Scaling	Cryo-CMOS
Precision Time based Analog Mixed-Signal Circuits / Event Driven Architectures	Chiplets	Integrated Wireless Power Transfer
Wide Band Gap Materials (like GaN and SiC)	3D DRAM	Integrated Electrodes for Biosensing/Biostimulation
Power Electronics (front-end)	Backside Power Delivery Network (BPDN)	Biocompatible IC Packaging
Power Electronics (back-end)	Active Backside	Chip-as-a-System

PROPOSED RESEARCH AREAS AND FUTURE TECHNOLOGIES FOR INTERNATIONAL COOPERATION (1/2)

- **Flexible/Stretchable Electronics (T3.2):** Development of new devices, based on different substrates as polymers, paper, etc., mainly for wearable applications.
- **Edge/Fog Computing (T3.1):** Local data processing avoiding Cloud interaction to reduce data transmission and power consumption and improve system robustness.
- **Ultra-Low-Power & Long-Range Communication Systems (T3.2):** Devices and protocols for power-aware ultra-low-cost applications with many nodes and long-range coverage.
- **Architectures for System Validation & Maintenance (T3.2):** Novel strategies and methodologies for validation and maintenance of very complex systems, also based on AI & Machine Learning.

PROPOSED RESEARCH AREAS AND FUTURE TECHNOLOGIES FOR INTERNATIONAL COOPERATION (2/2)

- **Integrated Wireless Power Transfer (T3.2):** fully wireless IC's, with no need of external components.
- **Integrated Electrodes for Biosensing/Biostimulation (T3.2):** Extend the IC pads functionality/purpose to be used as integrated electrodes, in particular for biosensing.
- **Biocompatible IC Packaging (T3.2):** Extend packaging technologies to directly and openly address and support biocompatibility and biological safety.
- **Chip-as-a-System (T3.2):** Towards highly-miniaturized fully-fledged devices at the micro and nano scale (e.g., X-Dust concept), new design approaches and methodologies (both at chip and system levels, well beyond SoC and SiP) are needed.

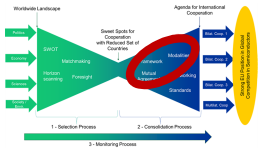


Coordination action: Determination of most interesting countries for international cooperation

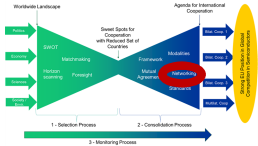
- Advanced Computation (T4.2) and Advanced Functionality (T4.3): matching EU strengths with gaps from other countries and vice versa
 - Assess EU (technologies and value chains) strengths/gaps along with those of other countries/regions.
 - Identify potential cases of complementary cooperative approaches.
- Applying filters for cooperation (T4.4)
 - Define relevant filters and prioritize concrete cooperation cases.
 - Interact with EU public authorities, EU corporations, EU societal actors, EU academia.

WP5 FOUNDATION FOR INTERNATIONAL COOPERATION

Support action: Agenda for, and initiation of, international cooperation



- Engaging with Stakeholders in international cooperation (T5.1)
 - Supporting the EU Commission with engaging with national authorities funding agencies outside EU.
 - Pooling resources at EU-level.
 - Collecting input from EU-stakeholders.
- Agenda for international cooperation in semiconductors (T5.2)
 - Preparation of a comparative analysis of modalities for cooperation and their applicability.
 - Advise towards implementation.



- Networking, Organizing and Attending large events (T6.2)
 - International cooperation will be based on existing activities that some of the ICOS partners have with initiatives such as IEEE IRDS and strengthen with new ones.
- Support the EC-non EU countries dialogue (T6.3)
 - Organization of workshops with consortium and selected external participants.
 - Delegation and mission to target countries for discussing research cooperation.
 - Initiation of international cooperation: Matchmaking event/platform.

INTERNATIONAL WORKSHOPS



ICoS
International Cooperation
On Semiconductors

WORKSHOP
**Sustainable Electronics & International
Cooperation on Semiconductors**

Grenoble (France)
April 26-28, 2023














ICoS
International Cooperation
On Semiconductors





SiNANO/ICOS WORKSHOP

SEPTEMBER 11th, 2023
Lisbon, Portugal

**European Strengths and Gaps in
Emerging Semiconductor Technologies**

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Thank you for your attention

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