



TWINRELECT

Overview of TWIN-RELECT

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Funded by the European Union (Grant Agreement N° 101160314). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

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TWIN-RELECT – Twinning for Excellence in Reliable Electronics

- **Project Mission**

- **Establish a cross-layer methodology for the design of reliable Systems**
- **Elevate the University of Thessaly's capacity in reliable electronic design**
 - Achieved through strategic collaborations with the partners
- **Elevate UTH's capacity at managing EU-funded research**

- **Project Timeline**

- Start: 1 October 2024
- End: 30 September 2027

- **Coordinated by:**

- **University of Thessaly**
 - Circuits and Systems Lab (CAS lab)

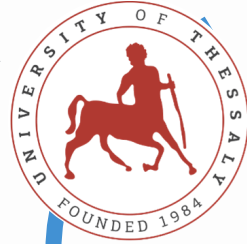


The Partners



5 Partners – 33 Researchers

Circuits and Systems Lab
research on custom-
developed EDA/CAD tools
focusing on reliability issues of
electronics in radiation
environments
9 Members



System Architectures Department
research on modelling and analysis of
fault mechanisms in digital circuits and
the design of fault-tolerant circuits and
systems
12 Members



Advanced Processor Technologies group is
devoting increasing attention to the development of
a new generation of fault-tolerant neuromorphic
computing technologies
3 Members



Institute of Electronics and Systems,
which is a joint research unit between
University of Montpellier and CNRS, is
specialized in sensors, devices and
systems for hostile environments.
Within IES, the RADIAC team is
particularly focusing on reliability issues
of electronics in radiation environments.
9 Members



The Growing Importance of Reliable Electronics

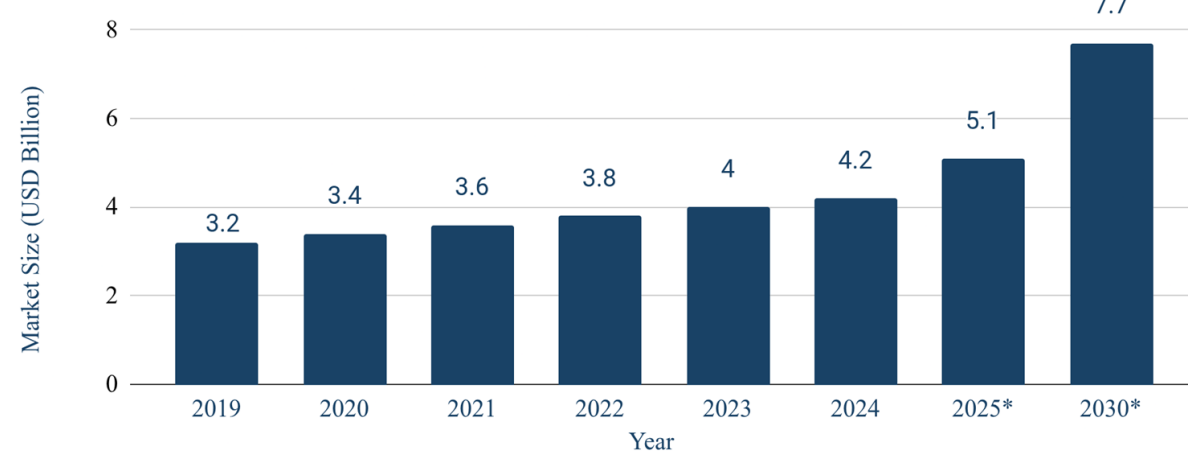
Why Reliable Electronics Matter?

Mission-critical applications demand electronics that never fail:

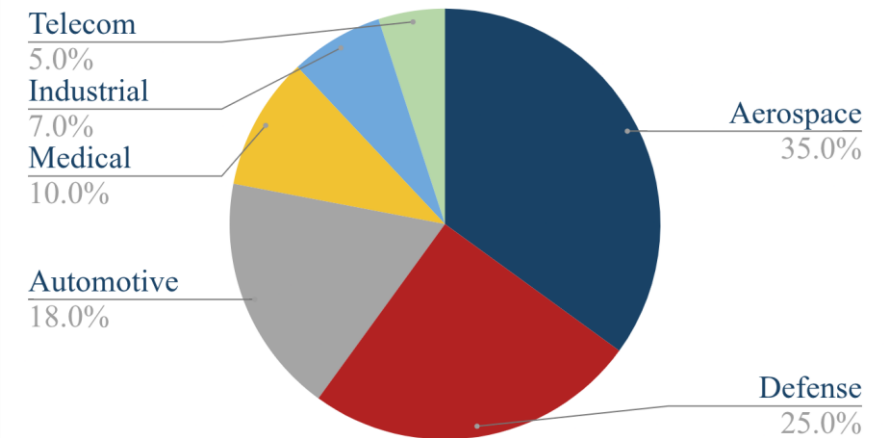
- **Space & Satellites**
Orbital systems, deep-space missions, New Space constellations
- **Avionics & Aerospace**
Flight control, navigation, communication systems
- **Automotive & Autonomous Driving**
ADAS, EV power electronics, safety-critical ECUs
- **Nuclear Power & Energy**
Reactor control, radiation-hardened monitoring systems
- **Medical & Industrial**
Implantable devices, diagnostic imaging, smart manufacturing
- **Telecom & 5G/6G Networks**
High-capacity, low-latency infrastructure requiring extreme uptime

The Challenge: With every new semiconductor technology generation, reliability challenges increase. US companies control >70% of the global EDA tools market. Europe needs competitive EDA solutions for reliable electronics design.

Reliability Semiconductors Market (USD Bn)



Market Share by Application Sector (2024)



Sources: Research and Markets (2026), Transparency Market Research, European Chips Act. * Projected values.

Cross-Layer Methodology for the Design of Reliable ICs

- **Objective:**

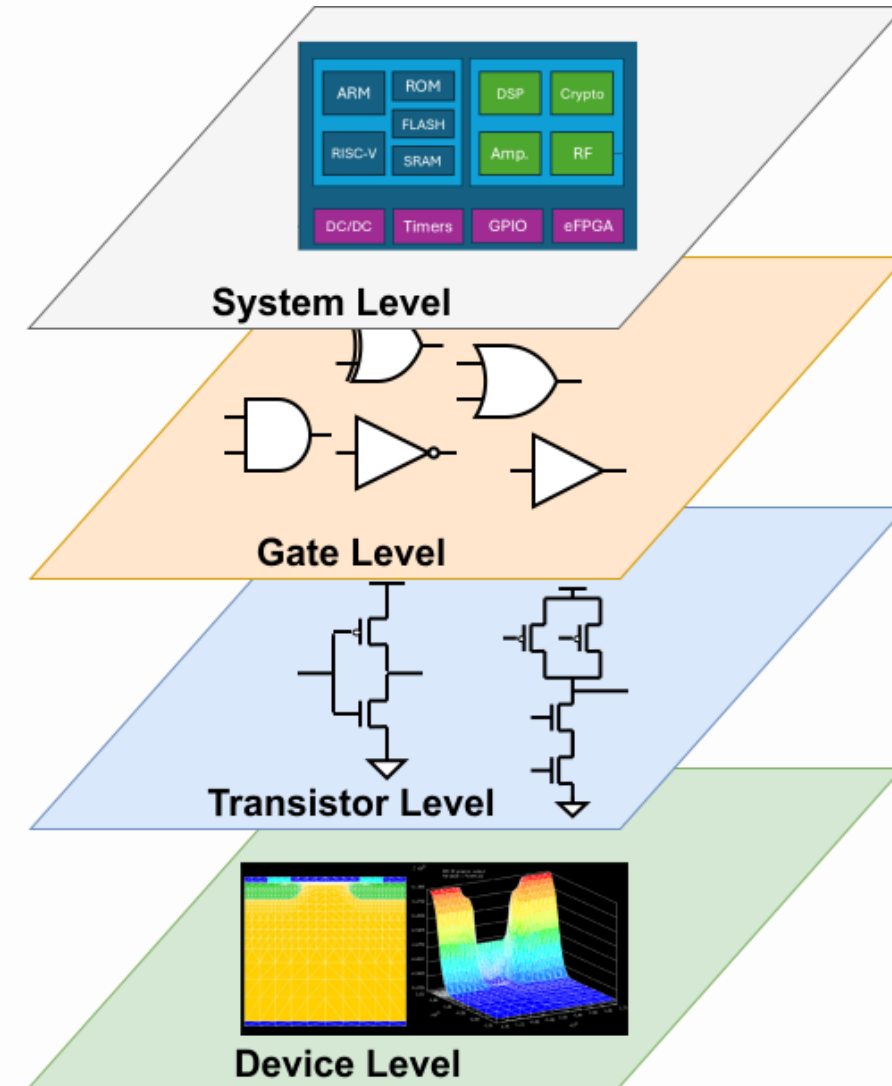
- Establish a cross-layer EDA tool flow for reliability analysis and design of reliable digital integrated circuits

- **Why a cross-layer EDA Tool Flow for Reliability Analysis?**

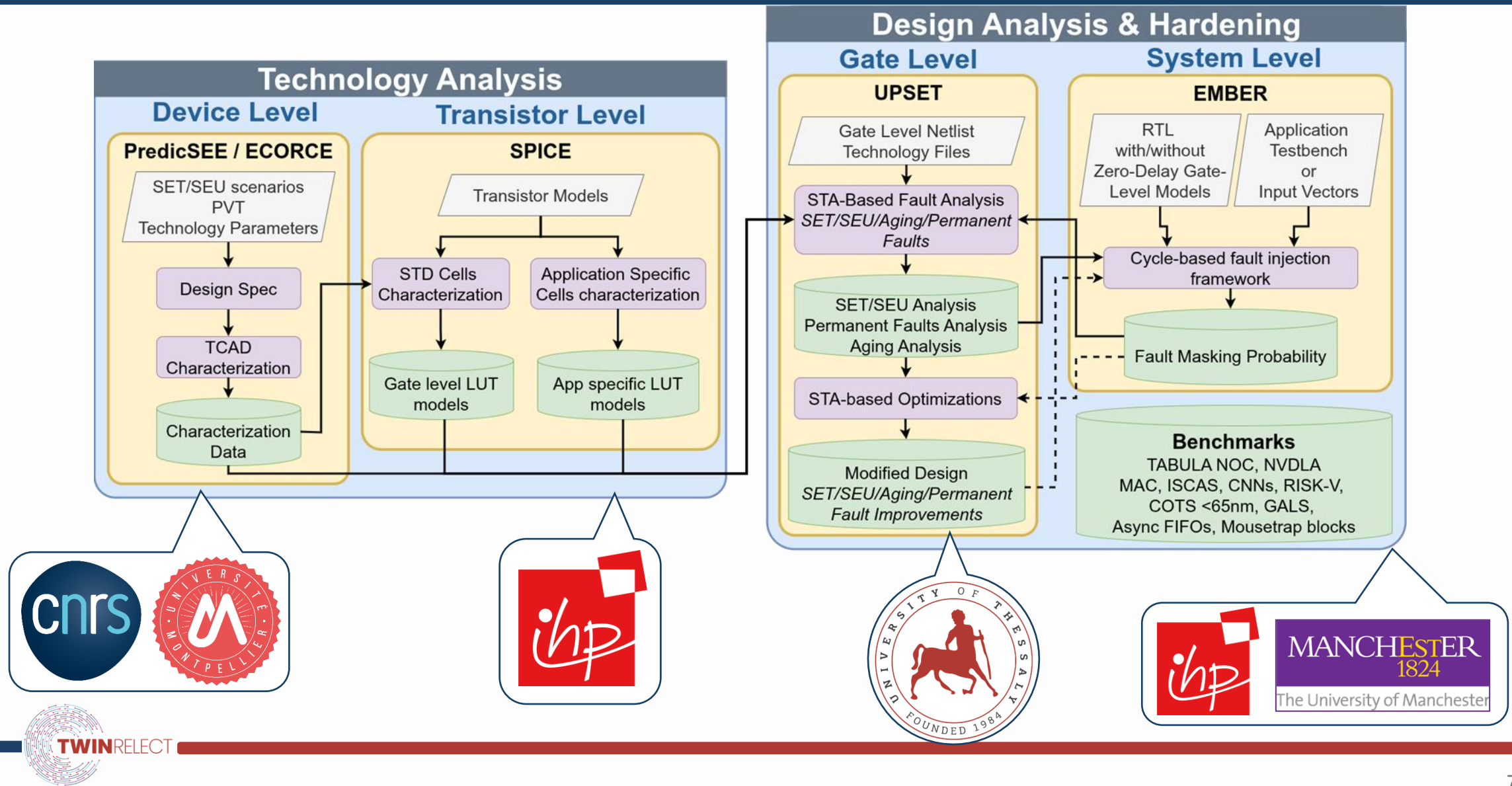
- Bridge the gap between fault analysis and design-for-reliability

- **Our Vision:**

- Enable a comprehensive reliability analysis across the entire design stack
 - By integrating fault modeling
 - **From device-level** physical simulations
 - **Up to system-level** fault injection
- While incorporating **Fault-Mitigation Techniques**
 - Allowing designers to actively improve the resilience of electronic systems



TWIN-RELECT Cross-Layer EDA Tool Flow for Design of Reliable Electronics



Main Activities Highlights

- **Publications:**

- At least 12 Conference Papers
- At least 8 Journal Publications

- **Organization of:**

- 4 Training Schools
- 3 Scientific Workshops
- 5 Research Management & Administration Workshops
- 2 Business Forums
- 3 Webinars
- 2 Special Conference Sessions
- Final International Symposium

- **Short-Term Visits to Partners**

- UTH PhD students will spend up to 10 months at partner institutions

- **Short-Term Visits to UTH**

- Experts from IHP, CNRS, and MAN will conduct short-term visits to UTH

- **Visits to Research Centers**

- CERN, CNRS, ESA, etc.

- **Attendance at:**

- Conferences
- Workshops
- Events, etc.

- **Joint Irradiation Experiments**

- Ionizing Particle Irradiation
- Gamma/X-ray irradiation
- Laser irradiation
- Accelerated aging
- EMI

Strengthen the R&I Capacity of UTH in the Field of Reliable Electronics

- **Objective:**
 - Enhance the training and research capacity of UTH's staff and PhD candidates to improve excellence and resources in Widening countries, helping to close the research and innovation gap within Europe
- **Key Actions:**
 - **Staff Exchanges**
 - Provide expert guidance and training
 - **Training through 5 joint experiments**
 - Foster collaboration and hands-on experience
 - **Joint mentoring of early-stage researchers from UTH**
 - Support growth and research capabilities
 - **Organization of 4 training schools**
 - Facilitate learning and knowledge sharing
- **Progress so far:**

25
Publications
(20 papers, 5 Journals)

3
Experiments

3
Training Schools

2
Exchanges



Enhance the Research Management and Administration Capacity of UTH

- **Mission:**

- Elevate UTH's capacity at managing EU-funded research

- **Key Actions:**

- **Establish an Office at UTH for International Projects**

- To support proposal development and project coordination

- **Develop a Research Management Handbook**

- A best-practices guide for EU project lifecycle management

- **Train Research & Admin Staff**

- Organize 5 workshops and staff exchanges with top EU institutions

- **Progress so far:**

4

Workshops
Organized

9

Staff members
trained

1

Handbook



Increase the Visibility of UTH at Local and International Level

- **Objective:**

- Strengthen UTH's research profile and international collaborations

- **Key Actions:**

- **Host High-Impact Events**

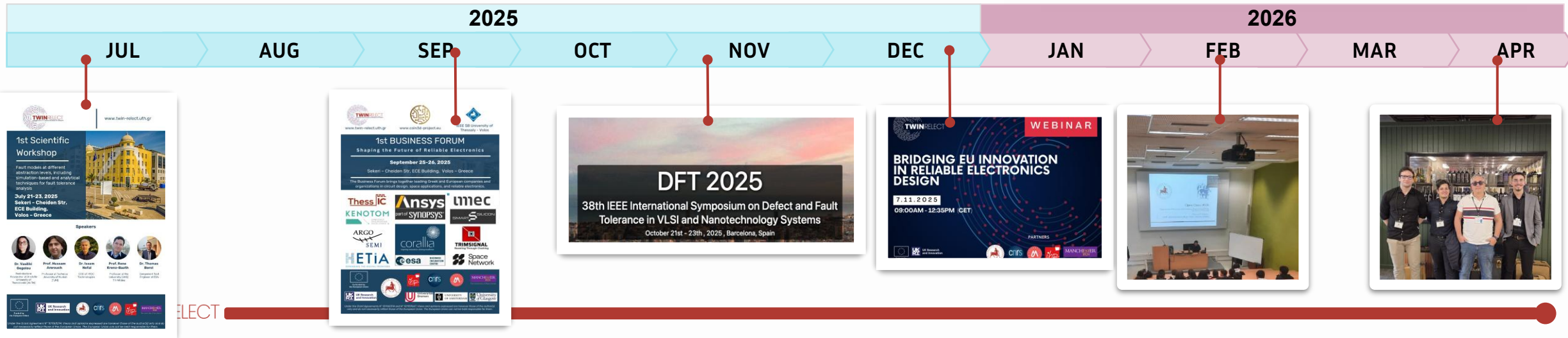
- 3 Scientific Workshops
- 2 Business Forums
- 2 Special Sessions at major Conferences
- 1 International Symposium in Greece
- 3 Webinars

- **Outreach Events**

- Participation in outreach events to promote the project

- **Enhance Visibility**

- Open-access publications, media outreach, project website, and social media



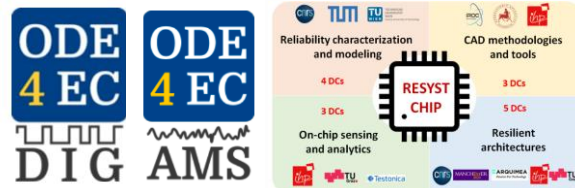
Strategic Networking with Advanced Partners and Interested Stakeholders

- **Objective:**

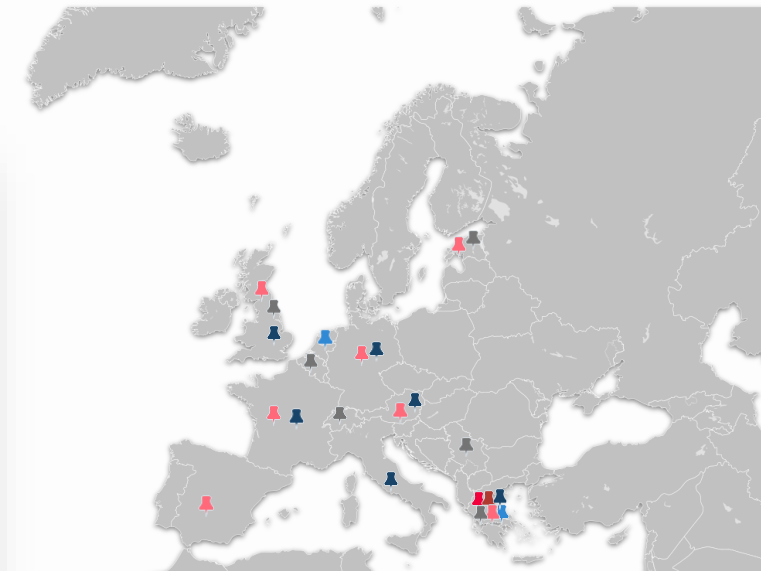
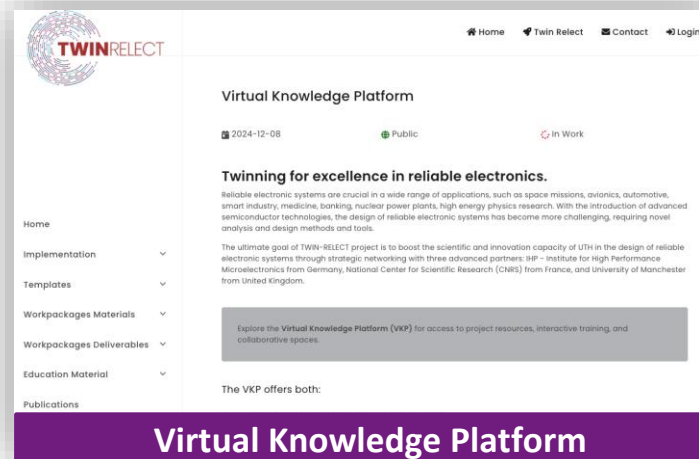
- Ensure sustainability of the project outcomes and position UTH as an EU Center of Excellence in reliable electronics.

- **Key Actions:**

- **Definition of Strategic Documents**
 - Scientific collaboration strategy
 - Education upgrade strategy at UTH
 - Commercialization of research
- **Setting up a Virtual Knowledge Platform**
 - As an online service to support the project and stakeholders
- **Built the foundations for long-term collaboration**
 - Submit at least 1 joint proposal

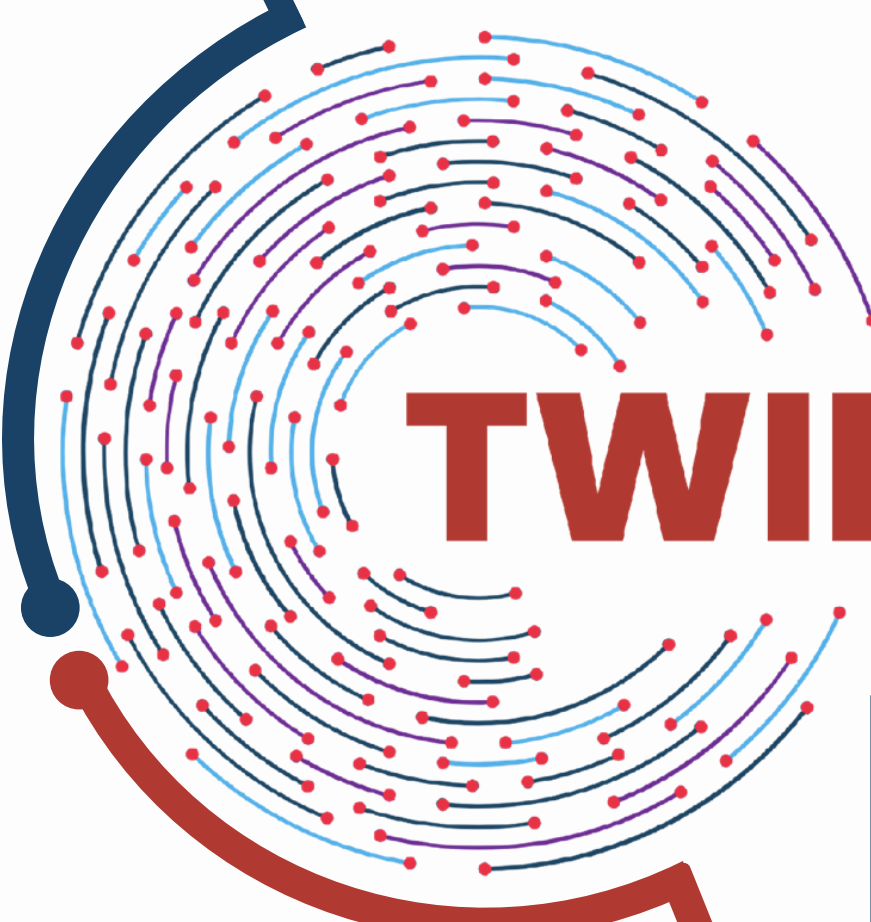


3 New Projects at UTH



Stakeholders' Map



A large graphic on the left side of the slide. It features a series of concentric, slightly irregular circular lines in blue, purple, and red. Small red dots are scattered along these lines. A thick blue arc is at the top left, and a thick red arc is at the bottom left, both pointing towards the center of the circular lines.

TWINRELECT

2nd TWIN-RELECT Scientific Workshop Agenda Overview



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2nd TWIN-RELCT Scientific Workshop Agenda

Monday, 13 July 2026

09:30 - 09:45	Introduction Prof. Christos Sotiriou, University of Thessaly	12:00 - 12:45	Customized Algorithm-Based Fault Tolerance for Modern AI Accelerators Prof. Giorgos Dimitrakopoulos, Democritus University of Thrace
09:45 - 10:30	Reliability vs. Security: Friends or Foes? Dr. Mahdi Taheri, Brandenburg University of Technology (BTU) Cottbus-Senftenberg	12:45 - 13:45	Lunch Break
10:30 - 11:00	Coffee Break	13:45 - 15:00	PhD Forum
11:00 - 12:00	Radiation Hardness Assurance at ESA – from low to high risk missions Dr. Viyas Gupta, European Space Agency (ESA)		

2nd TWIN-RELCT Scientific Workshop Agenda

Tuesday, 14 July 2026

09:00 - 09:45	Radiation Effects to FPGAs: An Overview Dr. George Tsiligiannis, Silicon Highway Technologies (SiHi)	13:15 - 13:45	An Overview of On-Chip Particle Detectors for Self-Adaptive Integrated Circuits for Space Dr. Marko Andjelkovic, IHP - Leibniz Institute for High Performance Microelectronics
09:45 - 10:30	Current experiences and capabilities of open source EDA tools for mixed signal chip designs Dr. Juan Sebastian Moya-Baquero, International Iberian Nanotechnology Laboratory (INL) & SymbioticEDA	13:45 - 14:15	Cross-Layer Analysis of Permanent Faults in Asynchronous NoCs for Neuromorphic Computing Prof. Davide Bertozzi, University of Manchester
10:30 - 11:00	Coffee Break	14:15 - 14:45	Error Monitoring and Hardening on the HARV (RISC-V) Microcontroller Prof. Luigi Dilillo, University of Montpellier
11:00 - 11:45	CERN Radiation Hardness Assurance (RHA) for Accelerator Electronics Dr. Salvatore Danzeca, CERN	14:45 - 15:00	Coffee Break
11:45 - 12:30	Reliability Challenges in Computing-in-Memory Systems Prof. Yiorgos Tsiatouhas, Department of Computer Science and Engineering, University of Ioannina	15:00 - 16:00	Closing the gap between Reliability Physics, EDA and Circuit Design Mr. George Konstadinidis, Technology and HPC/AI HW Design consultant
12:30 - 13:15	Lunch Break		

2nd TWIN-RELECT Scientific Workshop Agenda

Wednesday, 15 July 2026

09:00 - 09:45	Radiation-Hard Power Management and Control Circuits for the ATLAS Pixel Detector High-Luminosity Upgrade Prof. Michael Athanassios Karagounis, Dortmund University of Applied Sciences and Arts	12:30 - 13:30	Lunch Break
09:45 - 10:30	Neural Network Quantization Prof. Milan Dinčić, Faculty of Electronic Engineering, University of Niš	13:30 - 14:00	Combined Effects of Ionizing and Non-Ionizing Radiation: From Simulation to Practical Experiments Dr. Fabian Luis Vargas – IHP - Leibniz Institute for High Performance Microelectronics
10:30 - 11:00	Coffee Break	14:00 - 14:30	DFT Reuse Across Silicon Lifetime Dr. Artur Jutman, TalTech - Tallinn University of Technology and Testonica Lab
11:00 - 11:45	Open and Intelligent High-Level Synthesis Flows for Secure, Reliable, and Efficient Chip Design Prof. Christian Pilato, Politecnico di Milano	14:30 - 15:00	STA-Based Radiation Hardening Framework Nikolaos Chatzivangelis, University of Thessaly and Nikolaos Zazatis, University of Thessaly
11:45 - 12:30	Beyond Worst-Case Design for Energy-Conscious Dependable Architectures Prof. Georgios Karakostas, University of Thessaly	15:00 - 16:00	TWIN-RELECT Consortium Meeting

Welcome to Volos!!!

Have a Great Time!

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