

ECSEL MASRIA

Aeneas
Association for European Non-Economics Activities



EPoSS
European Technology Platform
on Smart Systems Integration

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Delegado Nacional

MASRIA

- **M**ulti
- **A**nnual
- **S**trategic
- **R**esearch and
- **I**nnovation
- **A**genda

Origin...

- ARTEMIS JTI – Embedded Systems
- ENIAC JTI – Nanoelectronics
- EPoSS (ETP, no JTI) – Smart Systems



- **ECSEL JTI** – Electronic Components and Systems

BUT

- No merging of associations!

Structure of MASRIA

- Part A: General, common strategy
- Part B: ENIAC contribution
- Part C: ARTEMIS contribution
- Part D: EPoSS contribution
- Parts B, C, D different in:
 - Approach
 - Structure
 - Style

From MASRIA:

- Guidance through many years
- Calls **topics/strategic priorities/activities** are issued from MASRIA
- Call year for each topic might not be clear

ECSEL Strategy - Nanoelectronics

- Design technologies;
- Processes and integration;
- Equipment, materials and manufacturing targeting miniaturisation, diversification and differentiation
- Heterogeneous integration

ECSEL Strategy – Embedded Systems

- Exploiting the ubiquity of the Embedded Systems/Cyber-Physical Systems
- Exploiting the connectivity of the networked Embedded Systems/Cyber-Physical Systems
- Optimising the factor Technology Time to Market/Technology Time on Market,
- Mastering the complexity while reducing the cost and increasing the performance
- Reducing and managing the energy and power consumption cost.

ECSEL Strategy – Embedded Systems

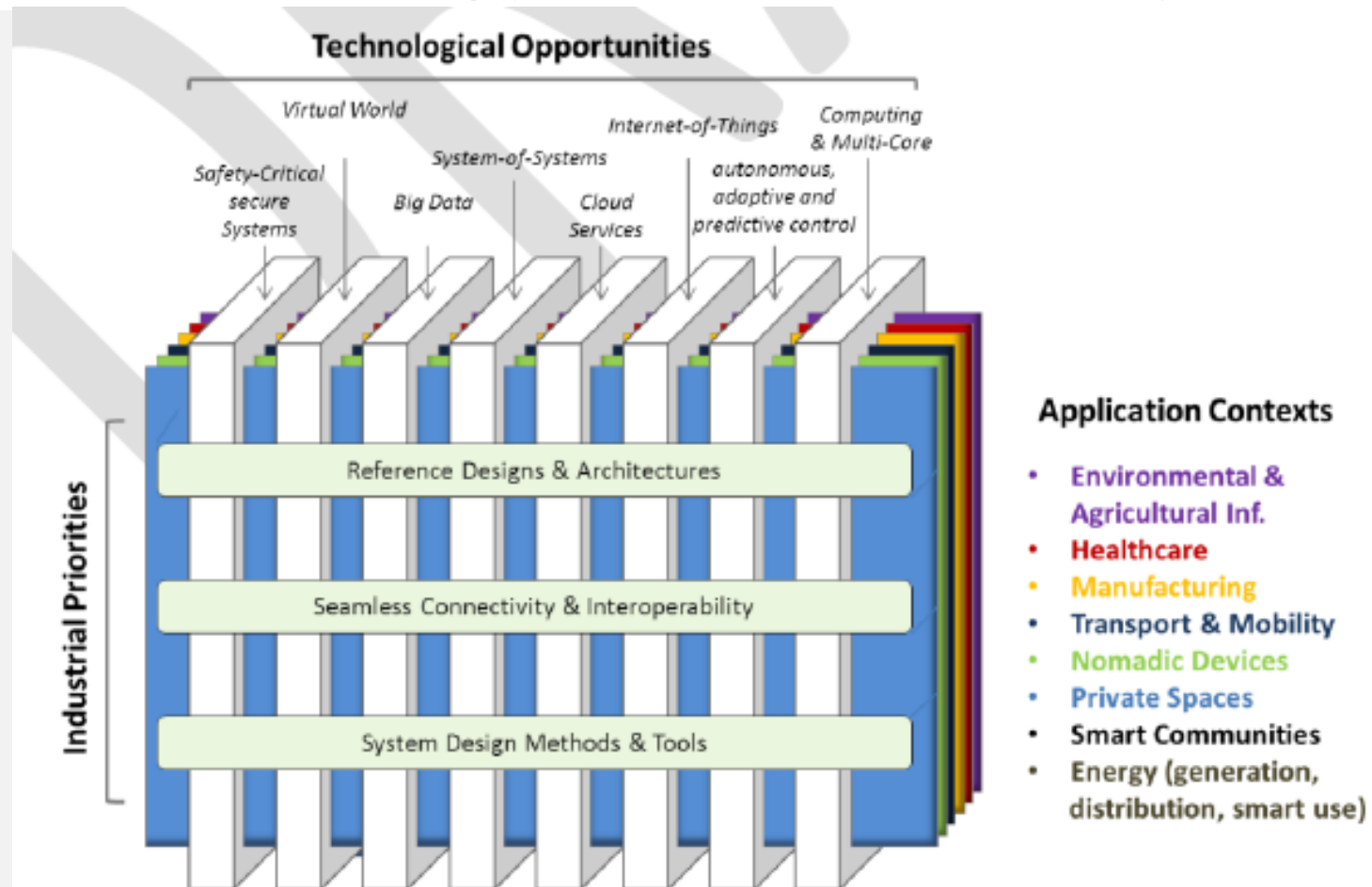


Fig 2 - ARTEMIS MATRIX 2.0

ECSEL Strategy – Smart Systems

Multi-disciplinary approach to obtain smart systems that are

- Self-reliant
- Adaptive
- Complex functionalities
- Sophisticated interfaces,
supported on:
 - Holistic design
 - Advanced manufacturing,
 - Mastering the complexity while reducing the cost and increasing the performance
 - Reducing and managing the energy and power consumption cost.

ECSEL Strategy – Smart Systems

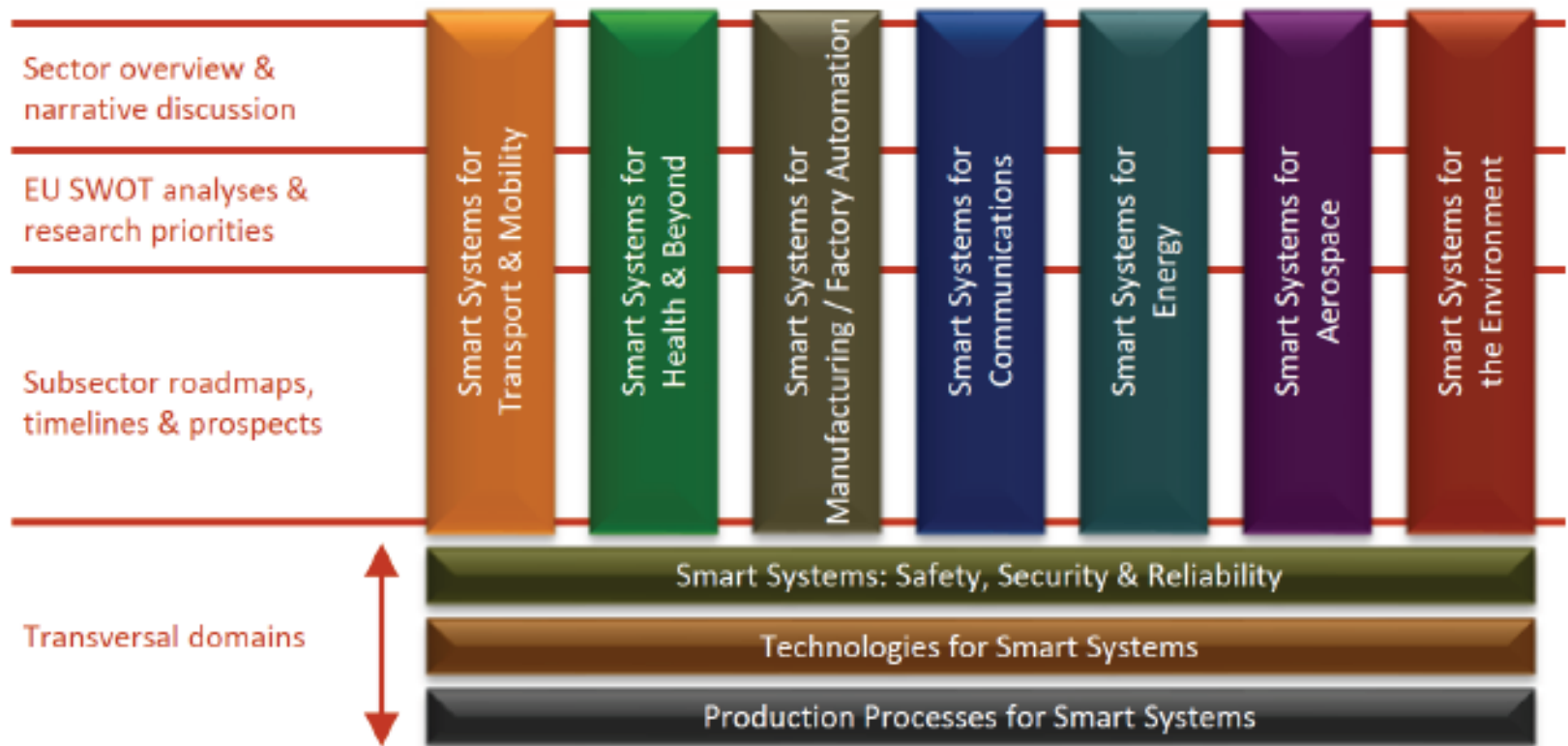


Figure: The Structure of the Strategic Research Agenda of EPoSS

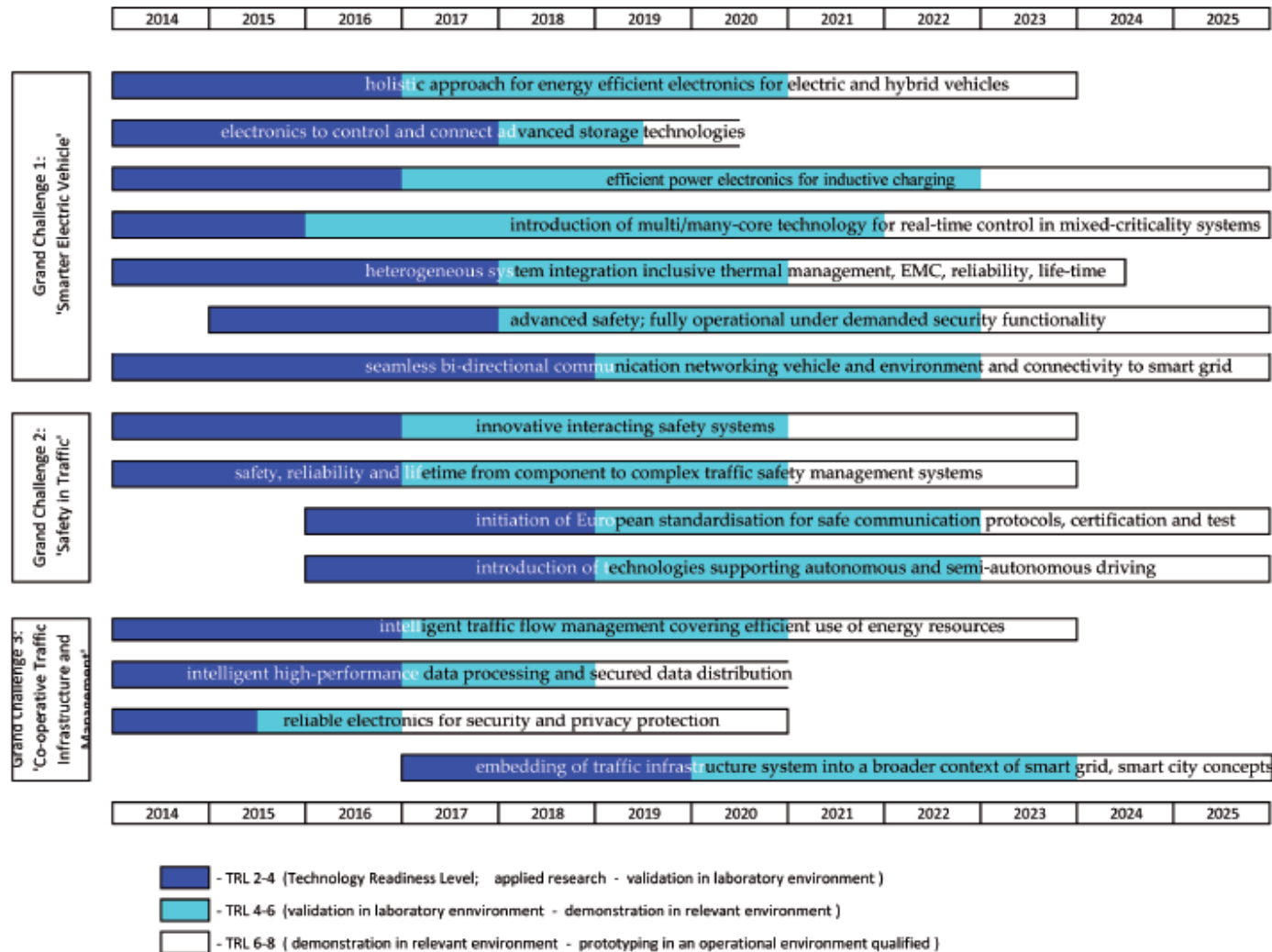
ECSEL: Nanoelectronics Areas of Activity

- Automotive and transport
- Communication & digital lifestyles
- Energy efficiency
- Health and the ageing society
- Safety & security
- Design technologies
- Semiconductor process and integration
- Equipment, materials, and manufacturing

ECSEL: Nanoelectronics Areas of Activity

- Automotive and transport
 - Grand Challenge 1: Intelligent Electric Vehicle
 - Grand Challenge 2: Safety in Traffic
 - Grand Challenge 3: Co-operative Traffic Management

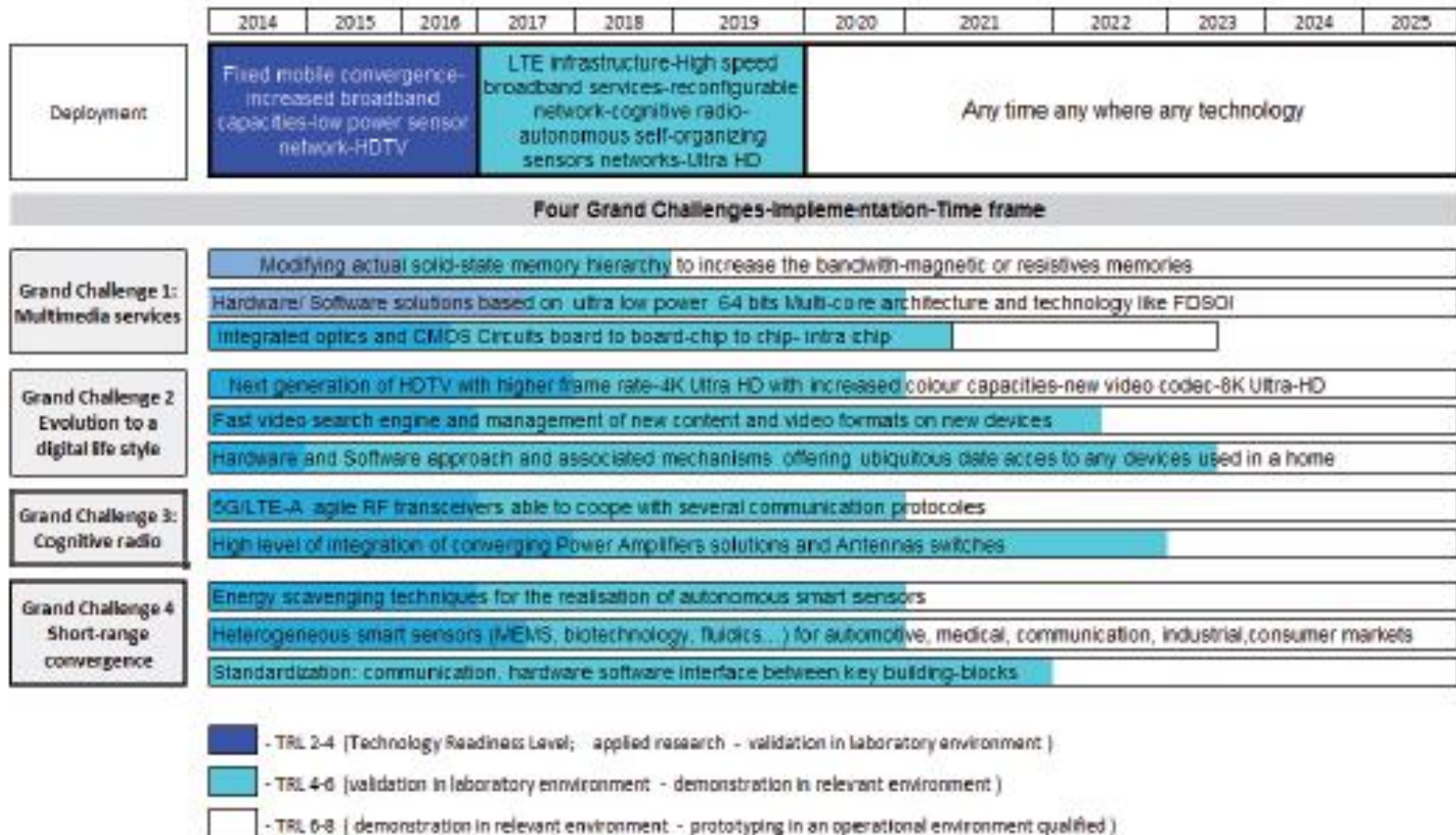
• Automotive and transport



ECSEL: Nanoelectronics Areas of Activity

- Communication & digital lifestyles
 - Grand Challenge 1: Internet Multimedia Services
 - Grand Challenge 2: Evolution to a Digital Lifestyle
 - Grand Challenge 3: Self Organizing Network
 - Grand Challenge 4: Short-range Convergence

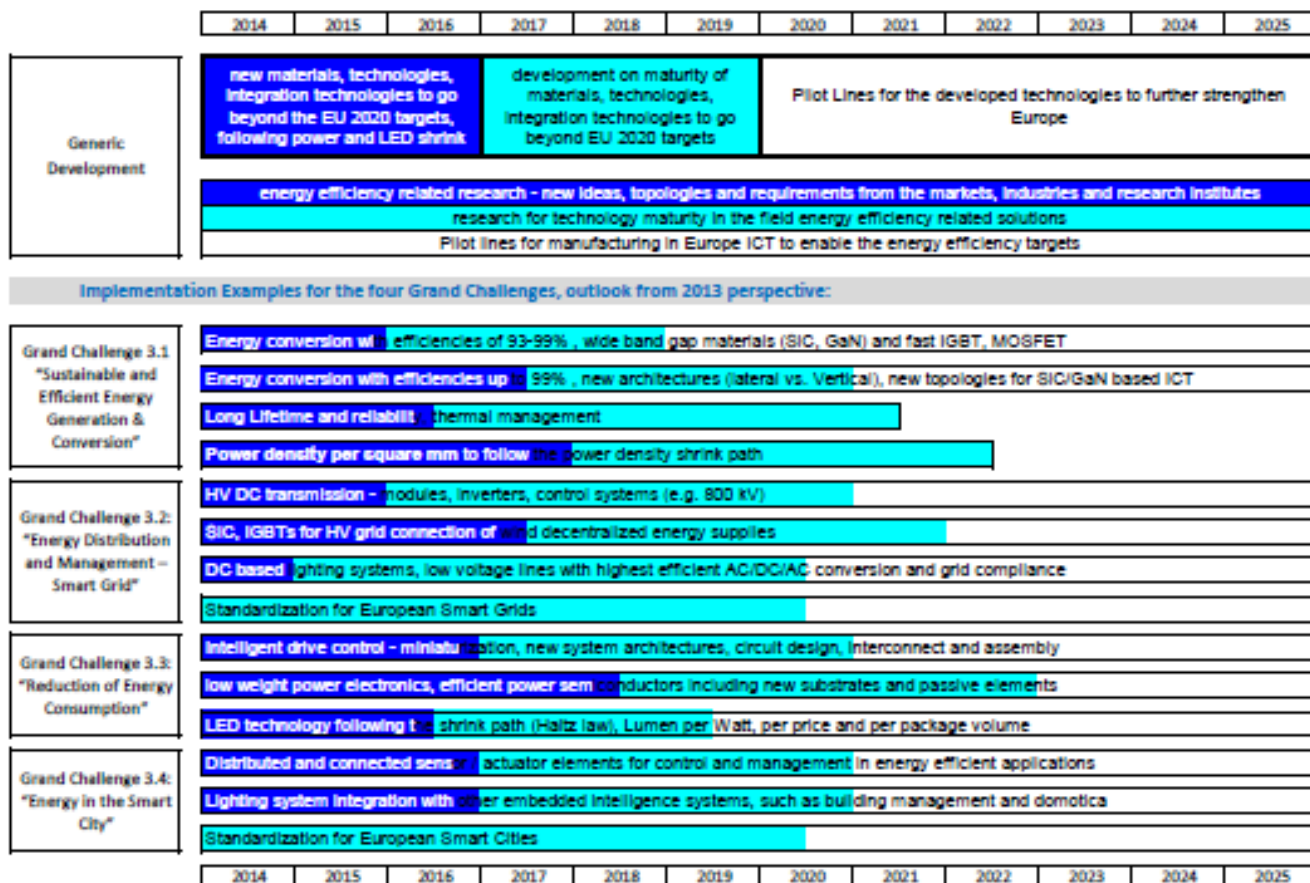
• Communication & digital lifestyles






ECSEL: Nanoelectronics Areas of Activity

- Energy efficiency
 - Grand Challenge 1: Sustainable and Efficient Energy Generation & Conversion
 - Grand Challenge 2: Energy Distribution and Management – Smart Grid
 - Grand Challenge 3: Reduction of Energy Consumption
 - Grand Challenge 4: Energy in the Smart City

• Energy efficiency



 - TRL 2-4 (Technology Readiness Level; applied research - validation in laboratory environment)
 - TRL 4-6 (validation in laboratory environment - demonstration in relevant environment)
 - TRL 6-8 (demonstration in relevant environment - prototyping in an operational environment qualified)

ECSEL: Nanoelectronics Areas of Activity

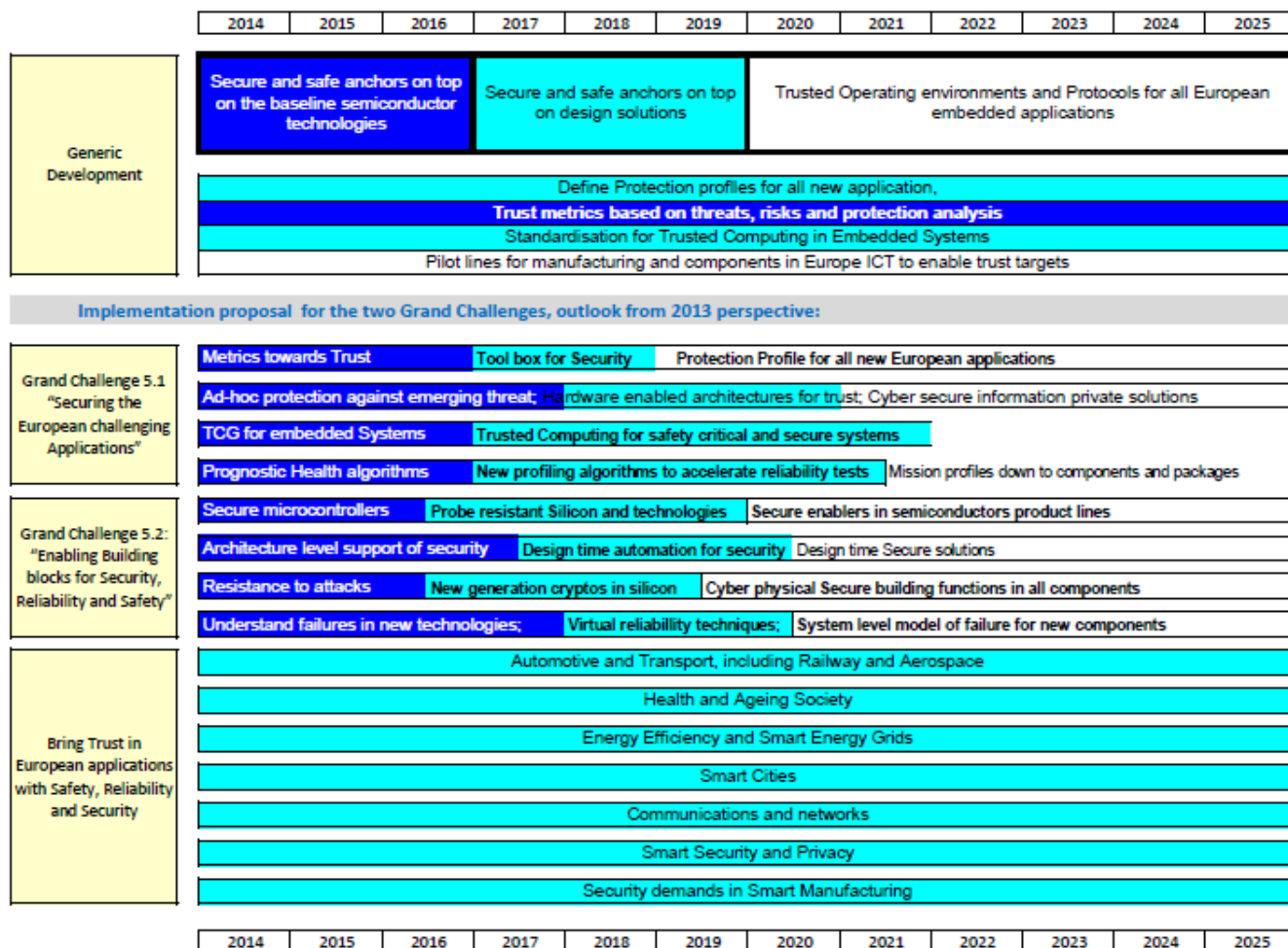
- Health and the ageing society
 - Grand Challenge 1: Home Healthcare
 - Grand Challenge 2: Hospital Healthcare
 - Grand Challenge 3: Heuristic Healthcare



ECSEL: Nanoelectronics Areas of Activity

- Safety & security
 - Grand Challenge 1: Consumer and Citizens Security
 - Grand Challenge 2: Securing the European Challenging Applications

• Safety & security



 - TRL 2-4 (Technology Readiness Level; applied research - validation in laboratory environment)

 - TRL 4-6 (validation in laboratory environment - demonstration in relevant environment)

 - TRL 6-8 (demonstration in relevant environment - prototyping in an operational environment qualified)

ECSEL: Nanoelectronics Areas of Activity

- Design technologies
 - Grand Challenge 1: Managing Complexity
 - Grand Challenge 2: Managing Diversity
 - Grand Challenge 3: Design for Reliability and Yield, Reliability and Robustness

• Design technologies



2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

research or TRL 2-4;

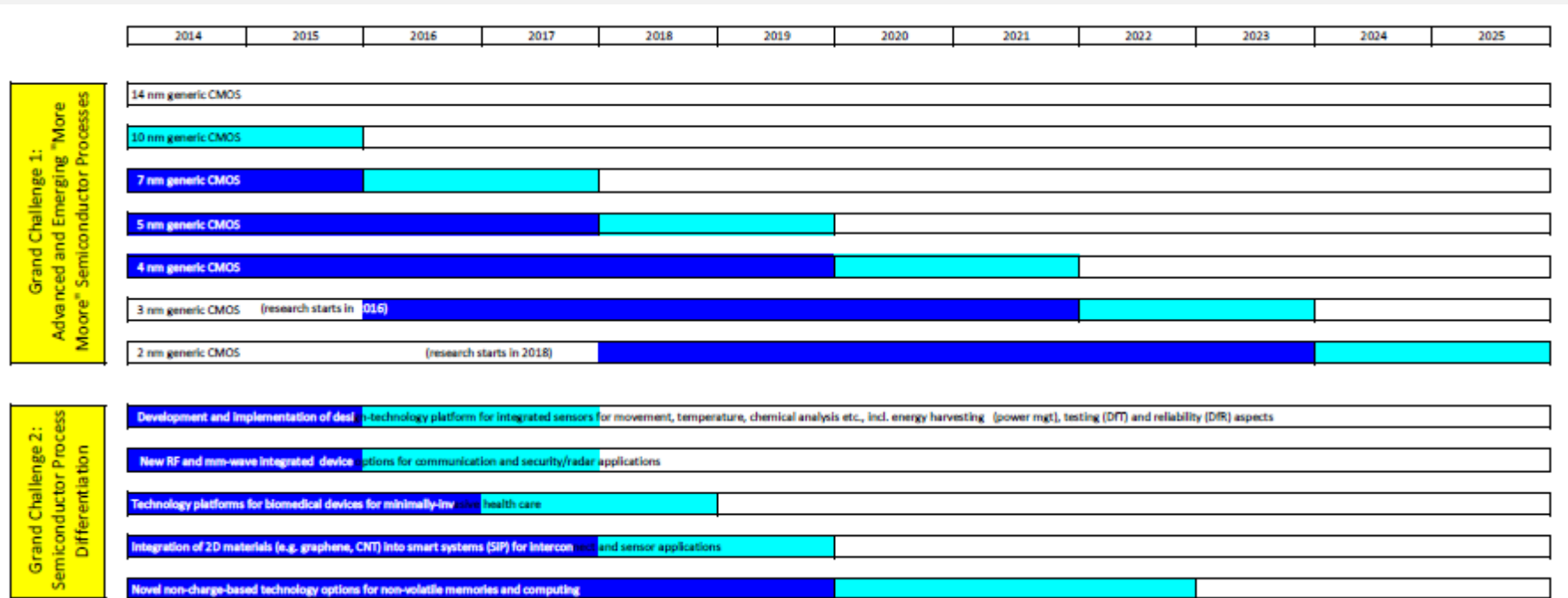
development or TRL 4-6;

pilot test or TRL 6-8

ECSEL: Nanoelectronics Areas of Activity

- Semiconductor process and integration
 - Grand Challenge 1: Know-how on Advanced and Emerging More Moore Semiconductor Processes
 - Grand Challenge 2: Competitiveness through Semiconductor Process Differentiation
 - Grand Challenge 3: Opportunities in System-in-Package

• Semiconductor process and integration



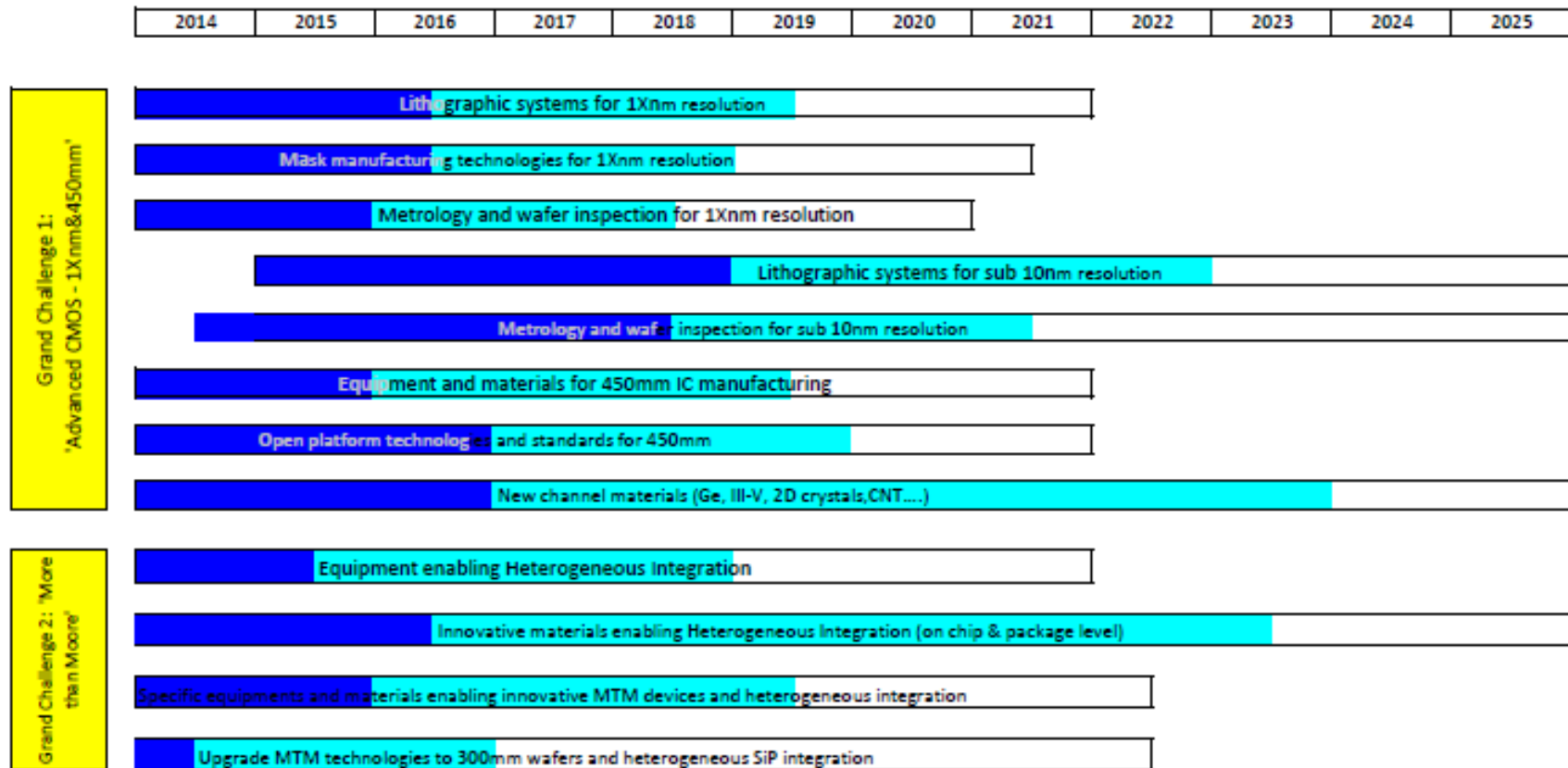
• Semiconductor process and integration



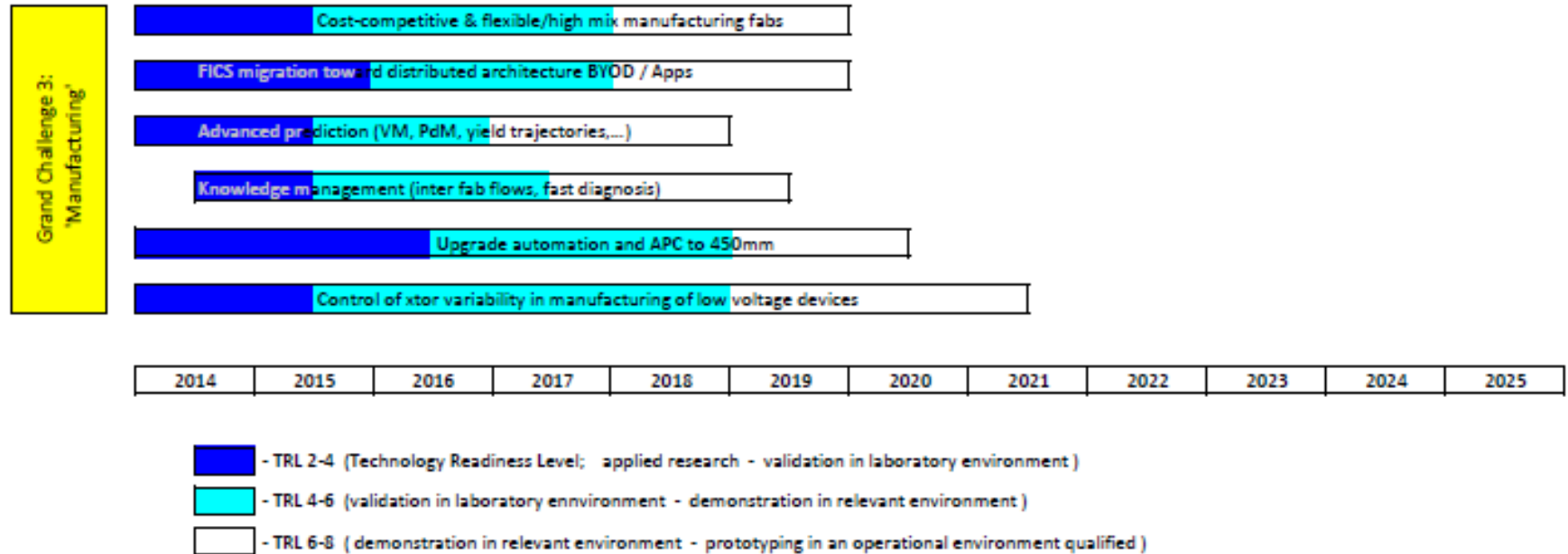
ECSEL: Nanoelectronics Areas of Activity

- Equipment, materials, and manufacturing
 - Grand Challenge 1: Advanced CMOS – 1X nm & 450mm
 - Grand Challenge 2: More-than-Moore
 - Grand Challenge 3: Manufacturing

- Equipment, materials, and manufacturing



- Equipment, materials, and manufacturing



ECSEL: Embedded Systems Areas of Activity

- Cyber-Physical enabled Embedded Systems
- Safe and Secure Systems
- Architectural Principles
- System Design and Virtual engineering
- Seamless Interaction (Networking and Connectivity)
- Modeling and simulation techniques for efficient Design methods and tools
- Computing Architecture and Energy Management

ECSEL: Embedded Systems Topics

- Cyber-Physical enabled Embedded Systems:
 - Optimal control using cyber-physical enabled embedded system
 - Architecture Principles for Cyber Physical Systems / Systems of Systems
 - Development of autonomous (cooperative) systems (with cooperative, distributed situation awareness and solution finding)
 - Safety and security for Cyber-Physical Systems

ECSEL: Embedded Systems Topics

- Safe and Secure Systems
 - Providing safety and enabling certification (ISO 26262) in highly complex and non-deterministic environments
 - Convergence of safety-critical systems and consumer IT
 - Software methods for real time data plausibility checks of generic inputs
 - Safety and security
 - Digital identities for Things
 - On board operating diagnostics systems for detecting malfunction of propulsion systems during operation
 - Modular data acquisition for generic inputs

ECSEL: Embedded Systems Topics

- Architectural Principles:
 - Reference Architectures
 - Architecture Principles for Seamless Connectivity and Interaction
 - Architectural framework for combined safety-related and security-related domains
 - Architectures and frameworks: **new use cases**

ECSEL: Embedded Systems Topics

- System Design and Virtual engineering :
 - Virtual Engineering for Systems of Systems
 - ‘Low-level’ semantics
 - Re-use of:
 - low-level software elements;
 - whole sub-systems;
 - design and validation tasks.
 - Complexity management of the embedded systems interactions
 - Complex systems and environments
 - Life Cycle Management

ECSEL: Embedded Systems Topics

- Seamless Interaction (Networking and Connectivity):
 - Seamless Interaction
 - Real-time Sensing & Networking in Challenging Environments
 - Increasing openness and interconnection (e.g., traffic control) while retaining security and safety properties (link to ASP3)
 - HMI/WMI : Reliably construct an accurate real-time image inside an embedded system and of its environment.

ECSEL: Embedded Systems Topics

- Modeling and simulation techniques for efficient Design methods and tools:
 - Integration of environment modeling and simulation into the HW and SW design flow
 - Efficient modeling and simulation of environmental effects on embedded systems in large complex systems,
 - Practical architectural exploration and development tools based on common meta-models
 - Implement complete Model-Based Design tool-chain (software “factories”)
 - Provide tool facilities to detect problems earlier in the development lifecycle
 - Provide capabilities to integrate easily specific process, meta-model, profile or architecture in development tools
 - Meta-model standardization
 - Development cycle navigation
 - Cooperation in the entire development process (link to AIP1)

ECSEL: Embedded Systems Topics

- Computing Architecture and Energy Management:
 - Strengthened use of multi/many core systems, System-on-a-Chip (SoC) and Network-on-a-Chip (NoC) technology
 - Innovative collaboration platforms that are based on loosely coupled systems with standardized flexible interfaces
 - enabling cost-effective, portable and efficient Many core/ multi-core programming
 - Efficient Energy Management
 - Observability and debugging
 - Joint Hw-Sw diagnostics

ECSEL: Smart Systems Areas of Activity

- Sensing/Actuating
- Signal and Cognitive Processing
- Energy Procurement, Storage, Management
- Networking (Data Receivers/Transmitters)
- Interfaces
- Knowledge Base

ECSEL: Smart Systems Areas of Activity

- Sensing/Actuating
 - Environment Monitoring and Recognition
 - Monitoring of body parameters and Health/ Usage Monitoring
 - Multiple-Parameter sensing
 - Remote Sensing
 - Nomadic/autonomous sensing
 - Functionalised sensing
 - Drive-by-wire/wireless
 - Motion control
 - Surface Actuation +Adaption
 - Transmission of touch+ smell
 - Precise Positioning

ECSEL: Smart Systems Areas of Activity

- Signal and Cognitive Processing
 - Pattern recognition
 - Closed-loop-control
 - Data Fusion
 - Self-learning
 - Life time prediction
 - Behavior prediction

ECSEL: Smart Systems Areas of Activity

- Energy Procurement, Storage, Management
 - Energy scavenging
 - Energy management

ECSEL: Smart Systems Areas of Activity

- Networking (Data Receivers/Transmitters)
 - Integration of Nomadic Devices
 - Sensor Networks
 - Body area Networks

ECSEL: Smart Systems Areas of Activity

- Interfaces
 - Managing the organic/inorganic Interface
 - Challenging environments (pressure, temperature, vibration, radiation)
 - Implantables
 - Augmented reality

ECSEL: Smart Systems Areas of Activity

- Knowledge Base
 - Mapping
 - Access to references/knowledge bases
 - Positioning & Targeting