



Semiconductor
Research
Corporation

MMI Informational Webinar Microelectronics

April 13, 2023

Jim Wieser - Texas Instruments

Decadal Plan for Semiconductors – 5 Seismic Shifts

Microelectronics Trends & Needs → MMI / SRC Research Aligned



Fundamental **breakthroughs in analog hardware** are required to generate smarter world-machine interfaces that can sense, perceive and reason.



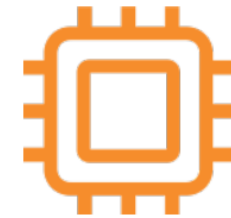
The growth of memory demands will outstrip global silicon supply presenting opportunities for **radically new memory and storage** solutions.



Always available communication requires new research directions that address the **imbalance of communication capacity vs. data generation rates**.



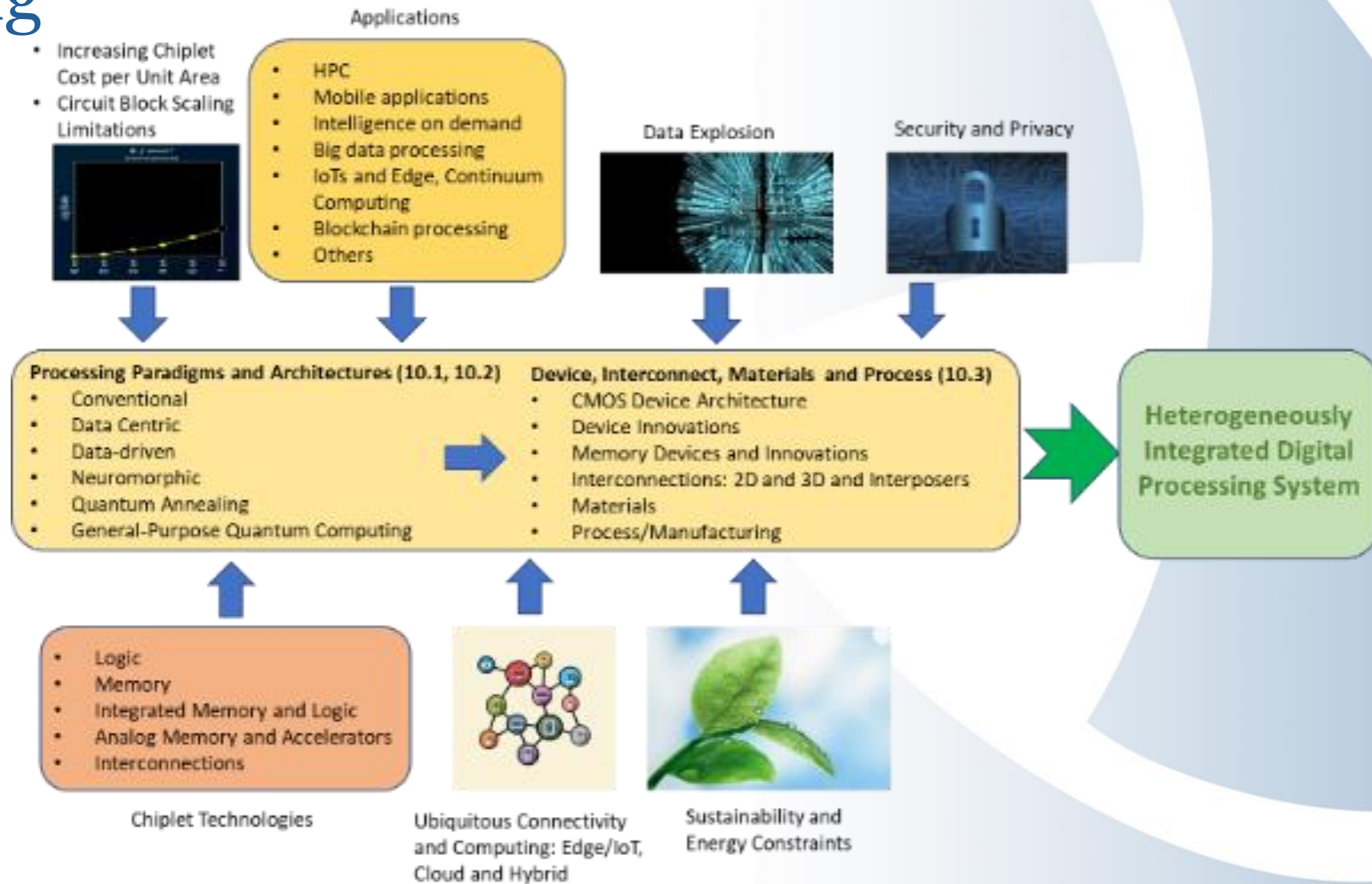
Breakthroughs in hardware research are needed to address **emerging security challenges** in highly interconnected systems and AI.



Ever rising energy demands for computing vs. global energy production is creating new risk, and new computing paradigms offer opportunities with **dramatically improved energy efficiency**.

Digital Processing

- Computation Energy
- Communications
- Memory/Architecture
- Security



Analog/Mixed Signal Processing

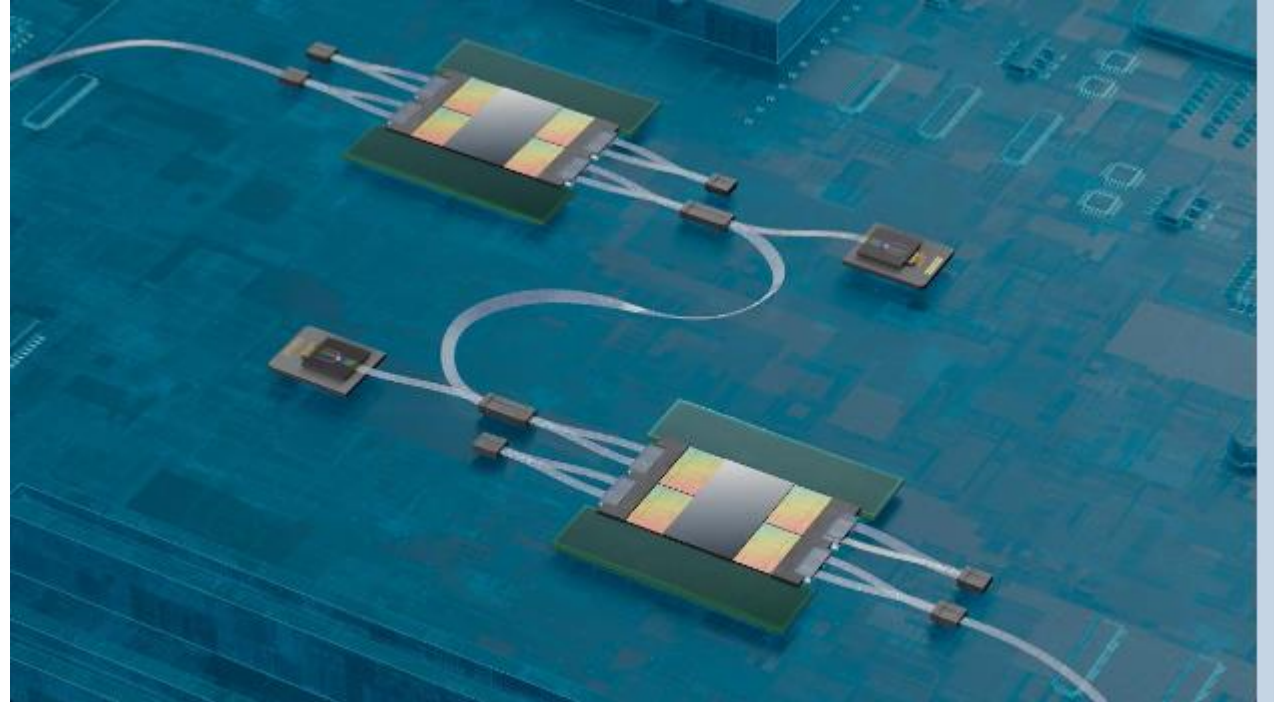
Enabling Energy Efficiency

- **Analog Data Deluge**
 - Intelligent Sensing
- **Computation Energy**
 - Power conversion & management
 - Efficient & adaptive
- **Communications**
 - RF/mmWave technologies
 - High speed I/O
 - Data converters
- **Security**
 - Hardware embedded



Photonics and MEMS

- **Analog Data Deluge**
 - Intelligent sensing/sensors
- **Memory Systems**
 - Access and storage
- **Computation Energy**
 - Architectures & systems
 - Optical switch/compute
- **Communications**
 - H/S chip/board/rack optical
 - High performance filters/oscillators



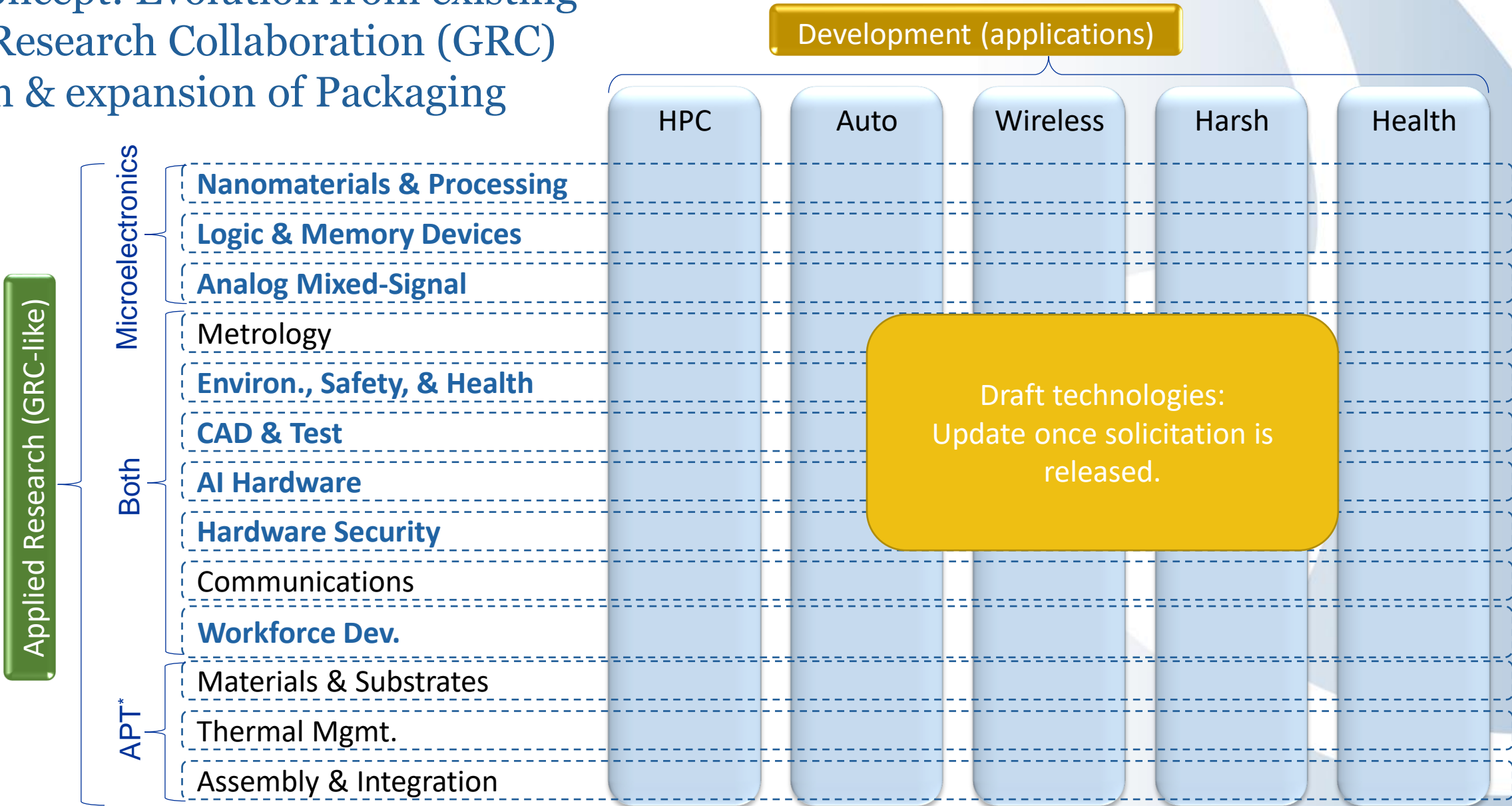
Summary

- MMI addressing microelectronics key technology trends and needs aligned to Decadal Plan and MAPT roadmap
- Many exciting challenges to address for the future – 5 seismic shifts
 - Digital Processing
 - Analog Processing
 - Photonics / MEMS
- Key cross cutting enablers
 - Heterogeneity – materials, devices, technologies, tools, packaging
 - Power Efficiency – management, conversion, control
 - Security at all levels – hardware and software
 - Packaging will be key enabler for future microelectronics scaling
- Opportunity to participate



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MMI Concept: Evolution from existing Global Research Collaboration (GRC) program & expansion of Packaging



* Advanced Packaging Technology
https://www.src.org/about/public-documents/src_rfi_response_to_nist_2022.pdf