

Trendy, Trendier, Trendiest

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AI has so overwhelmingly dominated the news cycle lately that one would think that it is the only technology game-changer in town. Where is AI heading? How will it shape the future? As Niels Bohr had said: "Prediction is very difficult, especially if it's about the future." Technology predictions are harder in terms of timing and business components. The IEEE Industry Advisory Board (IAB) has mainly focused on Megatrends within the last few years to provide a broader context and insight. A Megatrend is not a temporary fashionable technology originating from a single contributing IEEE Society or is limited to a region. It influences the evolution of multiple trends and impacts multiple factors (technological, economic, ecological, and social.)

Three Megatrends were identified: *Digital Transformation*, *Sustainability*, and *Artificial General Intelligence*. At the February 16-17, 2024 Quarterly Review meeting of FDC in Orlando, FL, the IAB summarized the latest refresh on these megatrends. *Figure 1* compares a Top-Down vs. Bottom-up view of the Megatrends against technology predictions that have popped up in 2024.

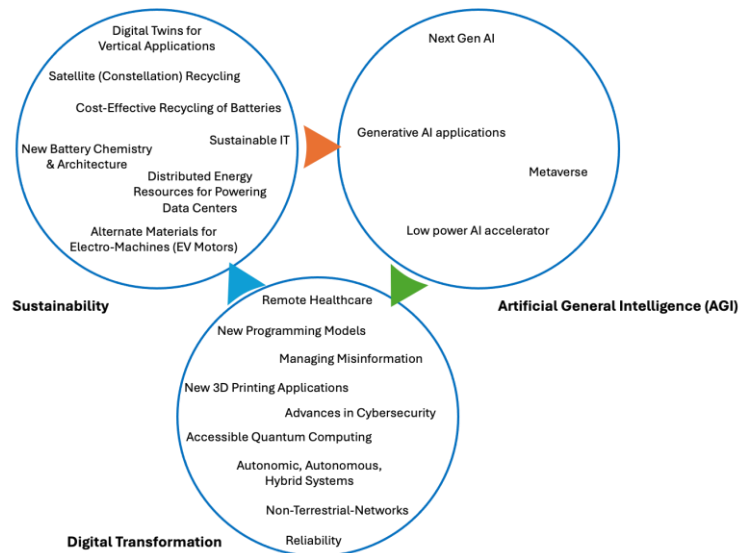


Figure 1: Top-down vs. Bottom-Up comparison of megatrends and technology predictions.

There are various opportunities for cross-pollination between industry, governments, professional organizations, and academia, as summarized in *Table 1*. The classification also offers some high-level insights:

- Technology with the most likely advancement and market maturity: Ubiquitous Connectivity, Communications, Cellular.
- Technology with the most likely market adoption: Healthcare (Digital, Remote, Personalized).
- Technology with the highest potential for impact on humanity: Genomics, DNA and Molecular Medicine.
- There are concerns for technologies with a large impact on humanity but limited chances for technological success such as Genomics, DNA and Molecular Medicine, Sustainable Manufacturing, Recycling and Re-use, and Decarbonization.

Opportunities			
Industry	Governments	Professional Organizations	Academia
Ubiquitous Connectivity, Communications, Cellular	Trusted Computing (Protection, Privacy, Security, Lineage)	Autonomous Technologies, Self-*	Autonomous Robots
Generative AI, ChatGPT	Sustainable IT, IT for Sustainability	Energy Storage	Genomics, DNA & Molecular Medicine
Healthcare (Digital, Remote, Personalized)	Electrification	Power & Energy Digital Transformation	Space Technologies
Smart Environments (City, Home, Lighting, etc.)	Clean Renewable Energy	Sustainable Manufacturing, Recycling, Re-Use	Wearable Implants, Computer Brains
Digital Twins			Decarbonization

Table 1: Opportunities for cross-collaboration across different groups.

The previous Megatrends form the guidelines for the initiatives undertaken by FDC in the past few years. Changes and new additions to the initiatives are illustrated in *Figure 2*. For 2023, four initiatives were added, namely, *Wireless Power Technologies*, *Sustainability Through Technology*, *Metaverse*, and *Global Semiconductors Ad Hoc*. One Initiative, *IEEE Quantum*, graduated after a successful 4-year stint and has morphed into the Quantum Technical Committee managed by the Computer Society. For 2024, the major addition is the *AI Coalition*, which will classify and gather AI work across IEEE into one area, and review how AI can enhance IEEE services. More details can be found at <https://cmte.ieee.org/futuredirections/projects/>.

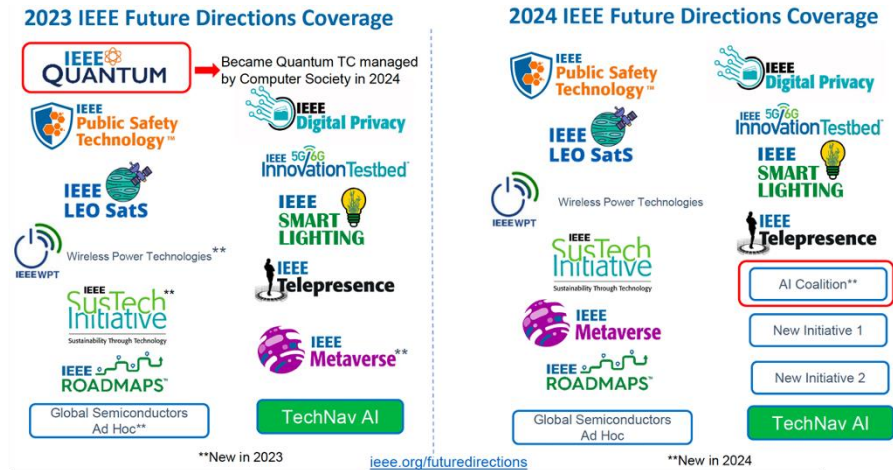


Figure 2: Initiatives within the FDC: 2023 vs. 2024.

FDC has also been fostering Technology Roadmaps across the initiatives and the various Societies and Councils. There are currently four established roadmaps with self-sustaining support communities and periodic updating efforts:

IRDS: International Roadmap for Devices and Systems.

HIR: Heterogeneous Integration Roadmap.

INGR: International Network Generations Roadmap.

ITRW: International Technology Roadmap on Wide Bandgap Semiconductors.

In-process roadmaps include *ITRD* (International Technology Roadmap of Power Electronics for Distributed Energy Resources from the PELS (IEEE Power Electronics Society)), *Energy Roadmap* from the PES (Power and Energy Society), *Reliability Roadmap* (from the Reliability Society), and a *Climate Change Technologies Roadmap* from CTS (Climate Technologies Society). More details can be found at <https://roadmaps.ieee.org/>.