Technology Predictions 2025

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IEEE Computer Society technology experts have unveiled 22 breakthrough technologies set to redefine industries and shape the future of our world for decades to come.

For the past 15 years, in January, the IEEE Computer Society has been predicting technologies likely to succeed during the following year. In the past few years, we have formalized this process and expanded it beyond our fields of interest, embracing, for example, power and energy, space, health, and other technologies. We also increased our diversity in terms of global presence, gender, culture, etc.

The 54-member 2025 Technology Predictions team foresees the following:

- accelerated growth in many artificial intelligence (AI) facets, requiring reskilling of the workforce
- U.S.-centric reduction in interest in sustainability due to new economic and sociopolitical pressures (not globally, though)
- ever-increasing automation in many dimensions, setting the stage for additional AI opportunities
- biotechnology's rapid development under the radar (for example, "AI-assisted drug discovery" and "AI-based medical diagnostics").

The 22 Technology Predictions for 2025 were broadly made in six categories: verticals (six predictions); applied AI (four predictions); user interfaces (two predictions); nonfunctional characteristics (four predictions); applied computing (three predictions); and energy-related (three predictions). The team evaluated technologies for their likelihood of success in 2025 (see the *x*-axis in Figure 1), impact on humanity (see the *y*-axis in Figure 1), maturity (color coded from very early to commercialization in Figure 1), market adoption (proportional to the bubble size in Figure 1), and adoption horizon (not presented in Figure 1; please see the full report in the supplementary material).

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The most likely to succeed and the largest market adoption in 2025 is large language model (LLM) deployment; the technology with the most impact on humanity is AI-assisted drug discovery. Some of the insights we made are the following:

- Small modular reactors offer a breakthrough solution for a sustainable and reliable data center energy supply.
- Wearables/biomarkers will continue innovations in sensor accuracy, energy efficiency, and real-time analytics.
- Next-generation cyberwarfare is emerging as a key area due to rising concerns around data integrity and AI vulnerabilities.
- The convergence of technologies through systems approaches (for example, IT/energy sectors) is predicted.

In addition to multiple insights, we also made recommendations to industry, government, academia, and professional organizations, such as IEEE, as well as different roles, such as end users, developers, chief executive/technology/finance/data/etc. officers, and investors.

Like in the past years, we will again develop a scorecard for our 2025 predictions, and we will release it in the last months of 2025. We actively improve our processes and synergistically develop them with the FDC's megatrends.

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For the first time, the team has identified key disruptions in 2025 and beyond 2025, which will influence technology development and adoption. We also mapped all technologies to the IEEE Future Directions Committee (FDC) megatrends:[1] digital transformation, sustainability, and artificial general intelligence.

Please read our full report in the supplementary material and provide feedback (contact information available at the end of the report). Also, please consider joining us in developing future reports.

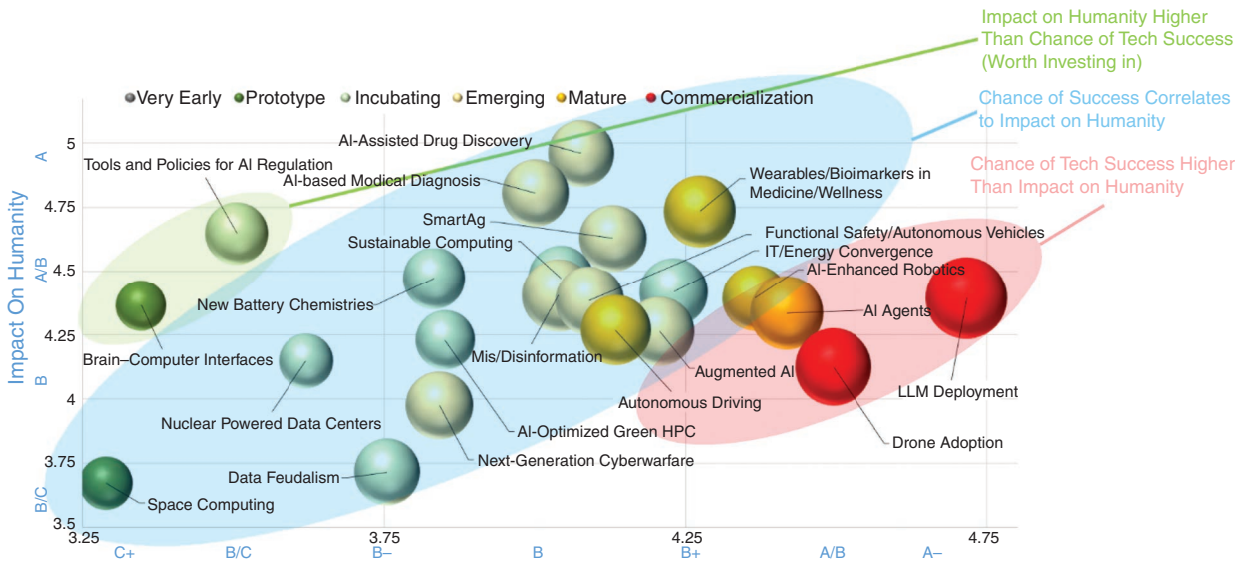

FIGURE 1. Comparing 2025 Technology Predictions, Clusters of Correlated Technologies. Technologies highlighted in light green have a higher impact on humanity than the likelihood of success and are worth investing in by governments. Those highlighted in light red have higher chances of success and are worth considering by the industry for further commercialization. Prediction: Tech. development in 2025 (*x*-axis) versus impact to humanity (*y*-axis) (size of bubble proportional to relative market adoption). HPC: high-performance computing; LLM: large language model; SmartAg: smart agriculture.

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