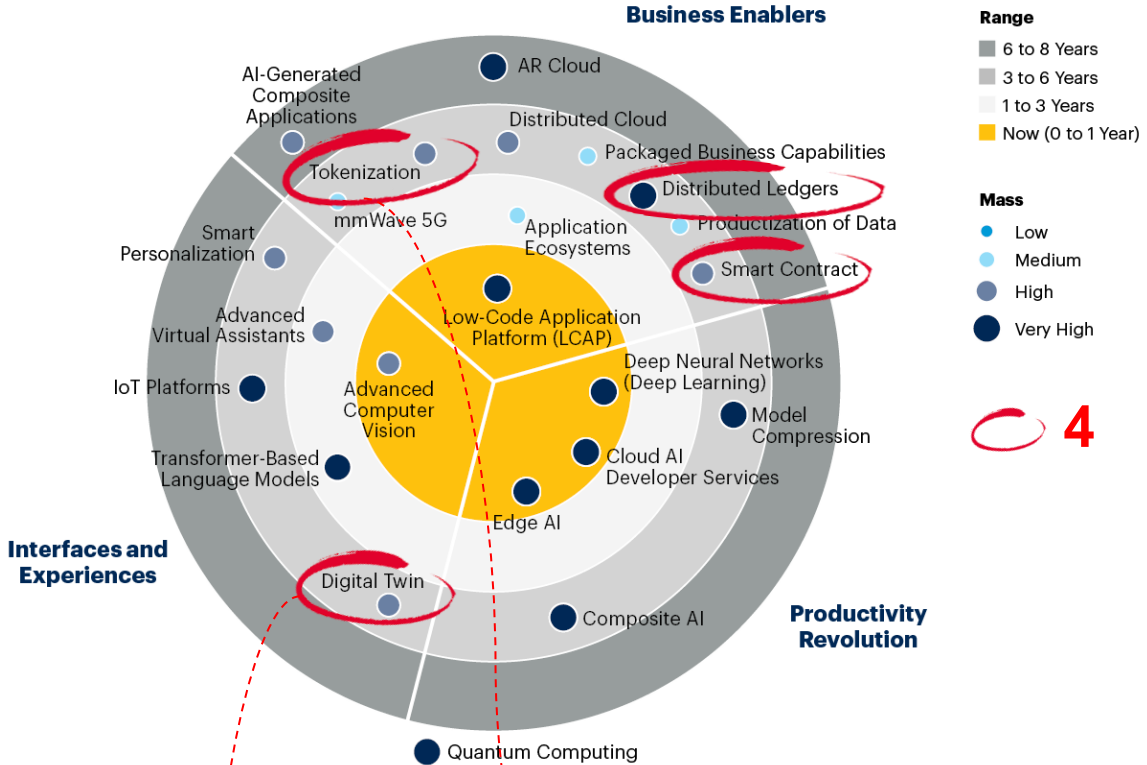
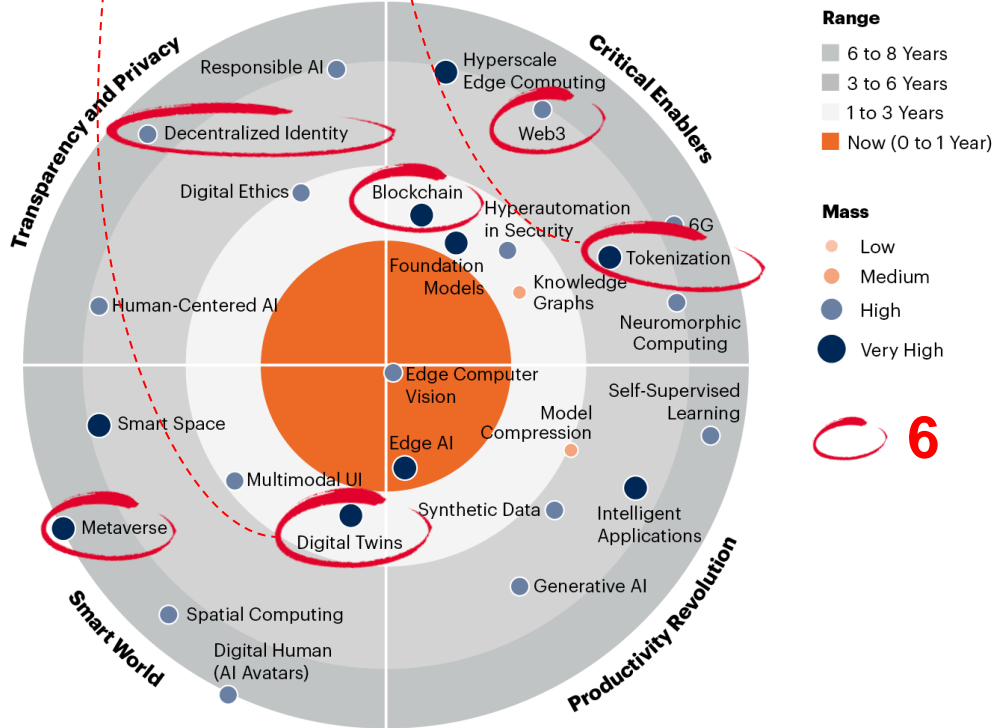


Gartner Emerging Technologies and Trends Impact Radar 2022 vs 2023

20
22



20
23



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Note: Range measures number of years it will take the technology/trend to cross over from early adopter to early majority adoption. Mass indicates how substantial the impact of the technology or trend will be on existing products and markets.

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Gartner Research Excerpt

Emerging Tech Impact Radar: 2023

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Emerging Tech Impact Radar: 2023

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Initiatives: Emerging Technologies and Trends Impact on Products and Services

Four themes define the most important emerging technologies for technology providers in 2023: the smart world, productivity revolution, transparency and privacy, and critical enablers. Product leaders must explore these technologies now to capitalize on market opportunities.

Overview

Key Findings

- A fusion of emerging technologies is occurring, such as both the evolving physical spaces and the interactions into information-rich and contextually expanded physical-virtual hybrid experiences.
- Advancements in artificial intelligence (AI) tools, technologies and applications are rapidly advancing the utility and automation potential of AI.
- Exponential growth in corporate and personal data collection will accelerate already increasing public, legislative and regulatory scrutiny.
- Critical enabling technologies, such as foundation models and neuromorphic computing, are allowing for previously unattainable technological advancement. In turn, these enablers are fostering new business and monetization opportunities.

Recommendations

Product leaders assessing the impact of emerging technologies and trends on products and services must take the following steps:

- Calibrate your investments in “smart world” foundations, such as digital humans, the metaverse, smart spaces, multimodal UI and digital twins, to deliver new customer value through advanced interaction experiences.

- Overcome current AI limitations by exploring new tools that increase the value of AI applications, such as edge AI, synthetic data and model compression.
- Mitigate litigation and negative brand association by proactively investing in tech and trends to promote transparency and privacy, such as digital ethics, responsible AI, human-centric computing, decentralized identity and homomorphic encryption
- Prepare for the disruptive effects of critical enablers by assessing the impact of innovative AI algorithms (such as foundational models) and decentralization on your product or service offering.

Analysis

Overview of the Emerging Tech Impact Radar

The Emerging Tech Impact Radar highlights the technologies and trends that have the most potential to disrupt a broad cross-section of markets. In this document, we have identified 26 of the highest-impact emerging technologies and technology trends (see Figure 1), organized around four key themes, which are critical for product leaders to evaluate as part of their competitive strategy.

This radar summarizes (but is not limited to) the technologies and trends found in this year's body of Impact Radar research and most closely aligned with (or most influential to) the four themes:

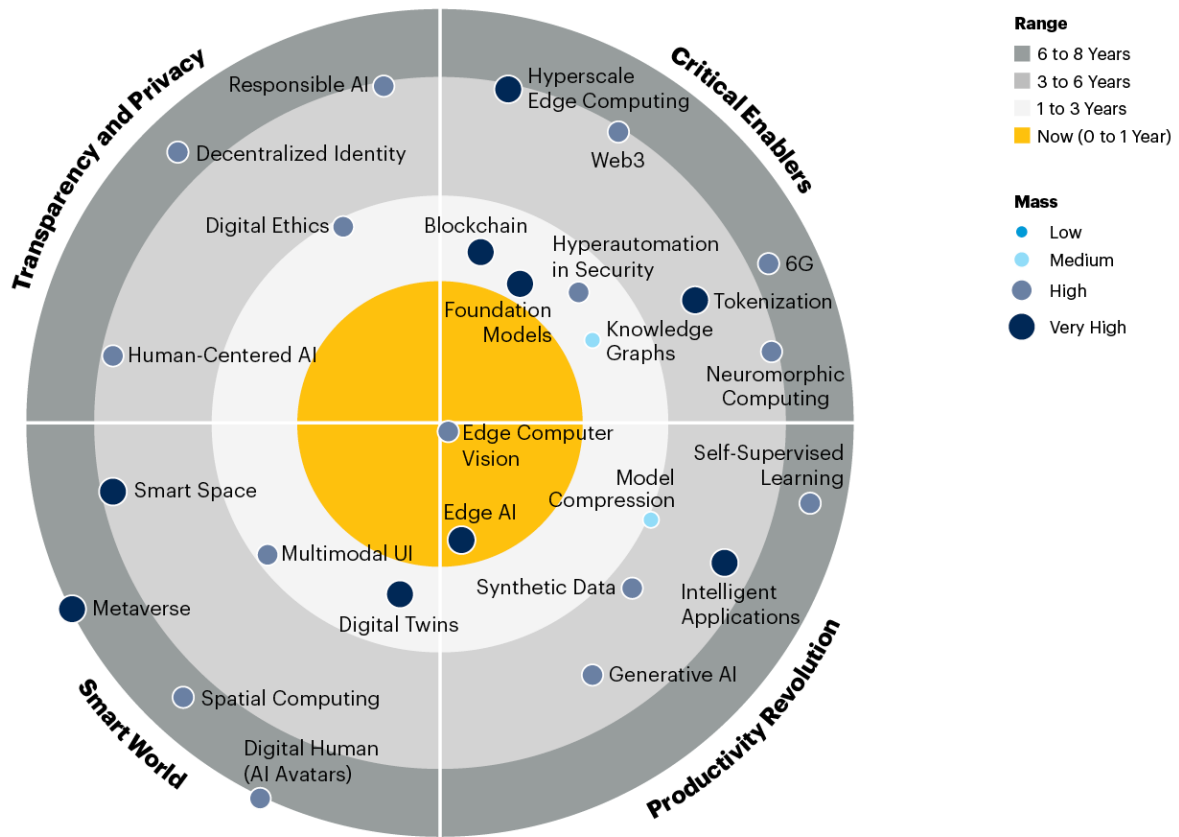
- Smart world
- Productivity revolution
- Privacy and transparency
- Critical enablers

The Impact Radar

Figure 1 shows the highest-impact emerging technologies and trends based on time to adoption.

Figure 1. Impact Radar for 2023

Impact Radar for 2023



Source: Gartner
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The objective of this research is to guide product leaders on how emerging technologies and trends are evolving and impacting areas of interest. Providers can leverage this knowledge to determine which technologies or trends are most important to the success of their business and when it makes sense to advance their products and services by investing in them. Refer to the How to Use the Impact Radar section for more information.

Emerging Technologies or Trend Profiles

Table 1 lists emerging technologies in 2023 according to their time to adoption. Click on a technology name in the table to jump to a profile of the technology.

Table 1. Most Impactful Emerging Technologies and Trends in 2023 Based on Time to Adoption

Now	1 to 3 Years	3 to 6 Years	6 to 8 Years
Edge AI	Blockchain	Generative AI	6G
Edge Computer Vision	Digital Ethics	Human-Centered AI	Decentralized Identity
	Digital Twins	Hyperscale Edge Computing	Self-Supervised Learning
	Foundation Models	Intelligent Applications	Spatial Computing
	Knowledge Graphs	Model Compression	
	Hyperautomation in Security	Neuromorphic Computing	
	Multimodal UI	Responsible AI	
		Smart Spaces	
		Synthetic Data	
		Tokenization	
		Web3	

The technology profiles in Table 1 are alphabetized. For an explanation of Gartner’s methodology for assessing Impact Radar technologies, see Note 1.

In addition to the technologies in Table 1, product leaders should track several longer-range technologies and be prepared to make early investments in them so as to be ready to utilize them when they come to maturity. These include:

- Metaverse
- Digital Humans

The Four Key Themes

The Smart World Is Changing Our Daily Lives

The world as we know it is changing, and thanks to AI, everyday objects are getting smarter, interactions are shifting from only physical to virtual and hybrid. And at the same time, physical spaces are becoming contextually aware environments. The world transformed by AI and digital technology is a smart world. It can offer transformative experiences in all aspects of business operations and daily lives of consumers, like:

- Multimodal UI and digital humans (AI avatars) are transforming human-machine interaction, making it more natural, as well as enabling a new era of intelligent software.
- Digital twin adoption is expanding to help improve business decisions and outcomes via the visualization and support of smart robotic fleets, complex manufacturing operations and smart cities or even individual objects, like a car or a digital human.
- Adjacent technologies such as IoT platforms and location services are supporting the development of contextualized and real-time digital twins due to the benefits of monitoring assets and products.
- The future collective 3D smart shared space will materialize in the metaverse that manifests from the combinatorial fusion of multiple technologies. A metaverse experience will enable the convergence of the physical and digital worlds in a persistent, contextualized and device-independent way, thus redefining the immersive experiences capacity for transport, transform and transact.

To reap the many benefits of the soon-to-be-smart world, tech providers should experiment early with the empowering technologies for the smart world creation: digital humans, smart spaces, multimodal UI and digital twins. The maturity of those emerging technologies stretch across multiple ranges, from multimodal UI and digital twins in the one- to three-year range to metaverse and digital humans actualization in the outer ring of the emerging tech and trends radar. This radar highlights that the creation of the smart world will happen gradually in the next five to eight years, conditional to development of technologies in critical enablers and transparency/privacy quadrants.

Advances in AI Applications and Tools Are Enabling a Productivity Revolution

Advances in AI are continually augmenting the productivity potential of AI applications, driving adoption. Edge AI is allowing models to be deployed on small, resource-constrained devices, moving intelligence closer to the point of data generation. It provides organizations with real-time intelligence, allows models to run in remote environments and reduces solution costs by eliminating 24/7 data streams to the cloud. One of the biggest areas of opportunity in edge AI is computer vision, as the edge architecture delivers significant performance improvements and benefits for computer vision applications. Similarly, intelligent business applications are injecting optimization, advisory and decision-support capabilities into the process-centric workflows of enterprise business applications.

Key AI tools – synthetic data and model compression – are enabling organizations to overcome AI adoption inhibitors such as access to sufficient data and model size. Synthetic data is the synthetic generation of datasets to help organizations overcome data access challenges to AI adoption. Further out in the adoption timeline is self-supervised learning, which eliminates human-in-the-loop from model training by enabling labeled data to be created from the data itself. This is useful when available data volumes are limited, or when the benefits of the machine learning (ML) solution do not outweigh the costs of manual labeling or annotating of data. Model compression can significantly reduce a model's size, with negligible performance impact, meaning larger, more complex algorithms can be deployed on resource-constrained devices. Together, these technologies will unlock new potential for existing and future AI applications.

Advancements in AI tools, technologies and applications are improving the utility and automation potential of AI and driving the productivity revolution.

Transparency and Privacy Required to Foster Trust in the Technology

The organization's adoption and scaling of emerging technologies in the smart world will depend not only on capabilities, maturity and ability to deliver business values, but also on sharp focus with regard to the transparency of AI decisions and regulatory compliance. Privacy and correct processing of personal data is a top priority for most tech providers, and it is a right that is protected by expanding regulatory changes (and accompanying litigation) across many countries. The challenge is further intensified by exponential growth in corporate and personal data collection that feeds various AI models to support real-time decision making or intelligence. This challenge requires tech providers to be ethical and responsible with AI-enabled systems from the design phase to mitigate AI risks, deliver equitable outcomes, respect privacy and enable explainability of AI-based outcomes. Many technologies in this segment will uncover hidden sources of value within data but will accomplish this in an ethical and responsible way, as well as provide a path to protecting privacy in a future smart world.

The technologies enabling transparency and privacy include digital ethics, responsible AI, human-centric computing, decentralized identity and homomorphic encryption. The majority of emerging technologies in this category are still in early development, residing in the six- to eight-year range (with the exception of homomorphic computing residing in the three- to six-year range). However, these technologies will be critical to facilitating the productivity revolution and the mainstream adoption of the smart world from both a societal trust and regulatory perspective. Strategic investment in those emerging technologies will enable tech providers to showcase their regulatory compliance and transparency in AI-enabled solutions, and enhance competitive product differentiation.

Critical Technology Enablers Are Driving the Next Generation of AI Applications and Web3

Critical enabler technologies are driving the next generation of AI applications and the evolution of Web3. Recent AI advancements, such as foundation models and graph technologies, are improving model intelligence and functionality. Foundation models are augmenting the accuracy of transcription, language processing and text analytics. Meanwhile, knowledge graphs architect relationships between data that deliver significant model performance improvements that are unachievable by linear decision trees. In addition to AI, hardware also plays an important role in enabling future application advancement. For example, hyperscale edge computing and neuromorphic computing will provide higher compute capability, which means more complex and larger algorithms can run closer to the point of data generation, delivering real-time intelligence and insight. These hardware developments, in conjunction with the aforementioned software advancements, will enable the next generation of high-performing AI applications.

The evolution of Web3 is also driven by advancements in critical enabler technologies. Web3 is a new stack of technologies for the development of decentralized web applications that enable users to control their own identity and data. Technologies that are enabling this advancement and control include blockchain and tokens, which are creating new possibilities in how we manage digital trust, enable decentralization and execute transactions, as well as exchange value across parties. As the economy continues to digitalize, the need for digital mechanisms to manage, exchange and secure physical and virtual assets will only grow, driving demand for enabling Web3 technologies.

These critical enablers are advancing the state of hardware and software performance, as well as enabling the creation and advancement of the digital economy.

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