Strategic trends that will influence business, government, education, media and society in the coming year.
The 1920s began in chaos. Cataclysmic disruption resulting from the first world war and the Spanish flu shuttered businesses and provoked xenophobia. Technological marvels like the radio, refrigerator, vacuum cleaner, moving assembly line and electronic power transmission generated new growth, even as the wealth gap widened. More than two-thirds of Americans survived on wages too low to sustain everyday living. The pace of scientific innovation—the discovery of insulin, the first modern antibiotics, and insights into theoretical physics and the structure of atoms—forced people to reconsider their cherished beliefs.

The sheer scale of change, and the great uncertainty that came with it, produced two factions: those who wanted to reverse time and return the world to normal, and those who embraced the chaos, faced forward, and got busy building the future.

It’s difficult not to see striking parallels to our modern world. A tumultuous U.S. election, extreme weather events and Covid-19 continue to test our resolve and our resilience. Exponential technologies—artificial intelligence, synthetic biology, exascale computing, autonomous robots, and off-planet missions to space—are challenging our assumptions about human potential. Under lockdown, we’ve learned how to work from our kitchen tables, lead from our spare rooms, and support each other from afar. But this disruption has only just begun.

With the benefit of both hindsight and strategic foresight, we can choose a path of reinvention. Our 2021 Tech Trends Report is designed to help you confront deep uncertainty, adapt and thrive. For this year’s edition, the magnitude of new signals required us to create 12 separate volumes, and each report focuses on a cluster of related trends. In total, we’ve analyzed nearly 500 technology and science trends across multiple industry sectors. In each volume, we discuss the disruptive forces, opportunities and strategies that will drive your organization in the near future.

Now, more than ever, your organization should examine the potential near and long-term impact of tech trends. You must factor the trends in this report into your strategic thinking for the coming year, and adjust your planning, operations and business models accordingly. But we hope you will make time for creative exploration. From chaos, a new world will come.

Amy Webb
Founder
The Future Today Institute
Macro Forces and Emerging Trends

For nearly two decades, the Future Today Institute has meticulously researched macro forces of change and the emerging trends that result. Our focus: understanding how these forces and trends will shape our futures. Our 14th annual Tech Trends Report identifies new opportunities for growth and potential collaborations in and adjacent to your business. We also highlight emerging or atypical threats across most industries, including all levels of government. For those in creative fields, you will find a wealth of new ideas that will spark your imagination.

Our framework organizes nearly 500 trends into 12 clear categories. Within those categories are specific use cases and recommendations for key roles in many organizations: strategy, innovation, R&D, and risk.

Each trend offers six important insights.

1. Years on the List
   We track longitudinal tech and science trends. This measurement indicates how long we have followed the trend and its progression.

2. Key Insight
   Concise description of this trend that can be easily understood and repeated to others.

3. Examples
   Real-world use cases, some of which should be familiar to you.

4. Disruptive Impact
   The implications of this trend on your business, government, or society.

5. Emerging Players
   Individuals, research teams, startups, and other organizations emerging in this space.

6. Action Scale
   FTI’s analysis of what action your organization should take. Fields include:
   - Watch Closely
   - Informs Strategy
   - Act Now

   **Watch Closely**
   - Mounting evidence and data, but more maturity is needed. Use it to inform your vision, planning, and research.

   **Informs Strategy**
   - Strong evidence and data. Longer-term uncertainties remain. Use it to inform your strategic planning.

   **Act Now**
   - Ample evidence and data. This trend is already mature and requires action.
Macro Forces and Emerging Trends

Scenarios Describe Plausible Outcomes
You will find scenarios imagining future worlds as trends evolve and converge. Scenarios offer a fresh perspective on trends and often challenge your deeply held beliefs. They prompt you to consider high-impact, high-uncertainty situations using signals available today.

1. Headline
A short description offering you a glimpse into future changes.

2. Temporal and Emotive Tags
A label explaining both when in the future this scenario is set and whether it is optimistic, neutral, pessimistic, or catastrophic.

3. Narrative
The descriptive elements of our imagined world, including the developments leading us to this point in our future history.

Scenario sources: The Future Today Institute uses a wide array of qualitative and quantitative data to create our scenarios. Some of our typical sources include patent filings, academic preprint servers, archival research, policy briefings, conference papers, data sets, structured interviews with experts, conversations with kids, critical design, and speculative fiction.

Macro Forces and Emerging Trends

1. 5G, Robots and Transportation

Self-Repairing Infrastructure
Self-repairing materials transform the environment we inhabit. Our cities are made with concrete that forms its own cracks, glass that seals if a window shatters and materials that contain microorganisms that release when they need. Some materials are made of smart polymers while others mix biology. These new materials change how architects design buildings and how governments engage in city planning. Refurbishing buildings with self-repairing materials creates new opportunities for the construction industry while stimulating economic growth.
There will be millions of implementations of robots-as-a-service over the next five years, which could generate billions of dollars of revenue.

As 5G comes online and reduces latency, robots will process spatial data at fast enough speeds to adapt to environmental changes.

Robots are now capable of "sweating" thanks to a soft, robotic muscle that can autonomously regulate its internal temperature, just like living organisms do.

Robotic dogs specially designed for Mars will travel in packs and assist each other as they climb, jump, and descend new terrains.

Some governments will consider granting the legal status of "electronic persons" to sophisticated robots.

Construction materials such as bricks could soon behave like human cells and evolve, replicate, and assemble organically with others.

China is creating a new mobility ecosystem that includes electric vehicles, apps, communications systems, artificial intelligence, and data, and it is intending to ship its products to the West.

Saudi Arabia is developing futuristic new megacities. They will have advanced technologies and urban ecosystems that rival every other major city.

Efforts are underway to create fully autonomous, AI-powered ships, along with a legal framework for them to operate safely and officially in international waters.