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Global Trends 2040: A Hyperconnected Future?

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SYNOPSIS

During the next two decades the advancements of technology will enhance human capabilities to address challenges such as healthcare, environment, quality of life but at the same time create tensions and disruptions within and between societies and states.

COMMENTARY

THE GLOBAL Trends 2040 is the latest publication of the Global Trends (GT) series, published every four years since 1997 by the United States National Intelligence Council. It provides assessments of trends and uncertainties around the globe for the newly-elected administration to help them prepare for a possible future.

The GT 2040 was built on two main principles: identifying and assessing broad forces that are shaping the future, and then exploring how people will respond to the forces. Demographics, Environment, Economics, and Technology were explored as the key forces; this commentary only highlights the Technology aspect discussed in the GT 2040.

Emerging Technologies Trends

In essence during the next two decades the advancements of technology will enhance human capabilities to address issues such as aging, climate change, and economic but at the same time create tensions and disruptions within and between societies and states. Global competitions in knowledge, talent and markets will increase. The race for technological dominance intertwined with geopolitics is even fiercer between US and China.

New technologies will emerge from different directions and at different timing. However, at the convergence of many unrelated technologies together with the increase in global competition will accelerate the emergence of cutting-edge technologies.

For example, decades of basic research and development in electronics, antennas, materials, batteries, telecommunications networks, and user interfaces has enabled the development of the smart phone.

By 2040 the convergence of artificial intelligence, materials, information technology, natural science as well as social science will enable breakthroughs with far-reaching implications. Time to develop emerging technologies is getting shorter and shorter from decades to years and sometimes faster.

Transformative Technologies

Even though it is difficult to predict emerging technologies but some fields such as artificial intelligence (AI), materials, biotechnology and information technology appear to offer the potential for transformative change in the coming decades. These fields are chosen to illustrate the potential benefits and risks of new technologies in the future.

Artificial Intelligence

Artificial intelligence will benefit all aspects of life from increased productivity, improved healthcare, better energy usage, increased agricultural crop yields and so on. AI will transform the way we live and work, creating new jobs, cutting others and it will drive significant economic and social redistributions.

As AI requires massive data to operate efficiently, it will evolve personal data to be shared in order to access to applications, therefore as a result it will impact security and privacy. Authoritarian governments could exploit data to monitor and control their populations. AI could also be used to generate misinformation for economic or political purposes.

AI is also being incorporated by a number of countries in their military warfare. AI will enhance the performance of weapons, defences, and security systems.

Materials and Manufacturing

By 2040, smart materials together with smart manufacturing will transform the processing conditions to the product performances, from civil to military applications in reducing costs, manufacturing time and reshape the supply chains while providing better performances and extended capabilities.

Smart materials could be stronger and lighter, with better corrosion and thermal resistance, self-healing or shape memory and so on. Advances in information technology, internet-of-things and robotics will allow manufacturing by demand and respond in real time to changing conditions.

Biotechnology

By 2040 biotechnology will continue to improve quality of life with better food supply and source, better mitigate the climate change and environmental issues, reduce disease and fossil fuel dependence.

In food security for instance, biotechnology has been utilised in various agricultural applications such as livestock management, improving crop yields, reducing crop loss, and reducing the use of fertilisers, herbicides and pesticides.

Biotechnology has allowed to alter conventional crop rice and maize varieties to have higher vitamin A, iron and zinc content to reduce the diseases like blindness and anemia that are related to vitamin deficiencies.

In livestock production, biotechnology has been used in reproduction, nutrition and production, and animal health. In aquaculture, biotechnology has enabled the identification and combination of fish and shellfish traits to increase productivity and improve quality, and development of natural products from marine organisms.

Information technology and hyperconnectivity

By 2040, we will have more devices, data and interactions, orders-of-magnitude from today, to connecting all different aspects of our life, across political and social boundaries.

Privacy and anonymity may be gone by choice or government mandate since all our personal and professional activities are monitored by global networks. With the assistance of AI, misinformation could destabilise societies at magnitude and speed much worse than the current situation.

Greater connectivity definitely increases the risk of cyberattack. Cyber security enforcement based on geographical borders is less relevant as the attack could come from anywhere around the globe.

Broader Implications: Managing Technology

Technology is neutral as it brings both benefits and generate risks. Therefore individuals, communities, and governments need to adjust and find ways to manage it.

Technologies bring us benefits for examples the current COVID-19 vaccine development where technologies, integrated in new and imaginative ways, can be quickly reapplied from their original use to solve crisis needs.

Technology has been used as geopolitical power. The United States has long led through years of investment in research, development and innovation. In the coming decades global technology competitions will be fierce and potentially could result in new technological leaders.

As technologies bring potential benefits to society, not everyone could reap them

equally. The gap between those who could access, exploit and adapt and those who are not able to is getting wider, exacerbating inequalities within societies and between states.

As more and more corporations, either national and multinational, are developing new technologies that rivals or even surpasses some states, national interests such as protecting security could be in conflict with corporate interests in maximising profits and expanding global market share.

A Hyperconnected Future: Boon or Bane?

Technologies and hyperconnected future will enable governments new tools to monitor their populations to provide better service and security but also allow them to control or target individuals.

Technologies can generate risks and it is upon us to imagine the potential impacts in scope and scale in order to develop strategies to minimise or manage it. It could be engineered pandemics, runaway AI or nuclear war. Even with very low probability, such high impact events are difficult to forecast; but identifying potential risks and developing mitigation strategies in advance could provide resilience to society.

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