



What if quantum theory inspired innovative solutions to global challenges?

20

Quantum X

UNCERTAINTIES

Systems, Technology

MEGATREND (Most significant)

Future Humanity

TRENDS

Cross-Sectoral Partnerships
Future of Purpose & Work
Mobilising Innovation

TECHNOLOGIES

Artificial Intelligence
Quantum Technologies

SECTORS IMPACTED

All Sectors

KEYWORDS

Artificial Intelligence
Climate Change
Mental Health
Quantum Theory
Uncertainty

Within Reach

Transitional

Visionary

Quantum theory provides a unique way to address and unpack complex global challenges, from climate and health to urban development and logistics, inspiring a new set of innovative solutions.



WHY IT MATTERS TODAY

Climate change is **accelerating**, with global temperatures rising over

1°C


annually, threatening species and exacerbating health issues



The need for innovative solutions to global challenges is pressing. Increasingly borderless, the information and communications technology sector grew by an average of 6.3% between 2013 and 2023, three times faster than the economies of 27 out of 38 countries in the Organisation for Economic Co-operation and Development.⁸⁰⁹ Challenges in this increasingly digital world include security, digital literacy, misinformation, disinformation, polarisation and cyberattacks.⁸¹⁰

The way that AI is both complementing and replacing jobs is also creating a sense of generalised uncertainty. Investment in generative artificial intelligence (GenAI) grew from \$1.3 billion in 2022 to \$17.8 billion in 2023,⁸¹¹ and there has been a parallel 53-fold increase in cyber incidents and hazards related to GenAI since late 2022.⁸¹² AI is expected to affect 40% of global jobs – up to 60% in high-income economies compared with 26% in low-income countries.⁸¹³ Although the actual impact of AI on jobs is not clear, there is a risk that AI may increase problems relating to income and wealth inequalities.⁸¹⁴

Other global challenges include both mental health and climate change. Approximately 14% of children and adolescents aged 10 to 19 years experience mental health conditions,⁸¹⁵ and across 31 countries, mental health is people's top health concern.⁸¹⁶ In terms of the climate, global temperatures are increasing more than 1°C annually on average and are expected to surpass 1.5–2°C target in the next two decades.⁸¹⁷ A million species are at risk of extinction,⁸¹⁸ and infectious diseases, deforestation and pollution are expected to continue to proliferate.⁸¹⁹ Nonlinear and deeply interconnected, complicated multiscale models are key to understanding the impacts and developing potential solutions.⁸²⁰

A person with dark skin and short hair is shown in profile, looking upwards with their eyes closed. Above their head, several glowing orange and yellow orbits, similar to planetary paths, swirl around. The background is a deep black space filled with numerous small, bright stars and a larger, more complex star cluster or nebula in the upper right. The overall mood is one of wonder, contemplation, and intellectual exploration.

Quantum theory and related concepts help unpack how communities evolve in different ways within different contexts and spheres, **offering new ways of thinking and creative ways to disentangle increasingly complex challenges**



THE OPPORTUNITY



BENEFITS

Application of creative thinking across domains; innovative breakthroughs.



RISKS

Misapplication of quantum principles because of their complexity.

While quantum theory is a branch of physics, related concepts such as entanglement⁸²¹ and superposition⁸²² serve as metaphors for an era of rapid shifts, interconnected change, and complex societal challenges. As a result, quantum theory offers a unique lens to explore how communities evolve in different ways within different contexts and spheres providing new ways of thinking to solve increasingly complex challenges.

Quantum theory has been explored in various domains, from philosophy⁸²³ and international relations⁸²⁴ to explaining cognitive processes⁸²⁵ and mental health.⁸²⁶ For example, superposition reflects how human traits exist on a spectrum, shaped through intentional effort and deliberate choices.⁸²⁷ From climate change and healthcare to urban development and logistics, quantum theory helps integrate diverse perspectives, balancing technical, social, environmental and economic factors for robust, sustainable policies and solutions. Beyond quantum technologies,⁸²⁸ quantum principles could guide the redesign of physical and digital working spaces to facilitate collaboration and creativity.⁸²⁹ Quantum theory could offer a deeper understanding of climate patterns and the complex connections between climate mitigation, adaptation and resilience as well as providing insights into emissions for improved carbon accounting.