

## R&D Efforts to Advance Business Utilization of the Metaverse

The Metaverse, which offers services through virtual reality spaces, is poised to drastically change traditional IT uses. NTT DATA is verifying and evaluating technologies that enable the Metaverse, and is conducting proof-of-concepts (PoCs) to realize new business use cases that utilize the Metaverse.

NTT DATA has previously developed services related to the Metaverse, such as conferencing systems and safety courses that utilize virtual spaces. NTT DATA is also verifying and evaluating new technologies, such as head-mounted displays that provide highly realistic experiences, photogrammetry that facilitates the development of Metaverse spaces by copying the physical world into virtual spaces, and platforms that provide the basic functions of the Metaverse. Maximizing the use of the technologies, we are continuously verifying new business use cases that utilize the Metaverse. For example, with production line simulations in the Metaverse, we recreate new production lines in factories and allow people to confirm their functionality without the need for physical lines. This drastically



improves production processes, saving time and resources and allowing for more efficient and accurate evaluations of the production line performance. Additionally, with virtual offices within the Metaverse, we facilitate improved communication and business activities.

Through these R&D efforts, we will accumulate the necessary technologies and business know-how for the Metaverse, and support our clients' use of the Metaverse.

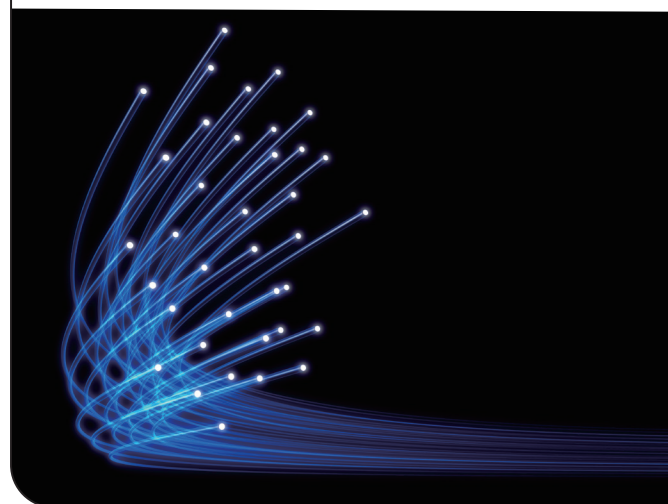
## The Future Envisioned by the Quantum Computer/ Next-Generation Architecture Lab Service

Quantum computing and its derivative technologies have the potential to perform traditionally difficult large-scale computations, which will lead to the creation of new business methods in various industries. NTT DATA's Quantum Computer/Next-Generation Architecture Lab

Service supports proof-of-concepts (PoCs) to create these new businesses in a wide range of fields, including manufacturing, finance, logistics, and chemicals.

To give one example, NTT DATA, NTT, and Komi Hakko Corp. have started joint experiments on the instantaneous and automatic synthesis of scents. Komi Hakko has a proprietary technology for describing all the information on scents that humans perceive as digital data. With quantitative scent data, it may be possible to automate the scent formulation process, which was previously performed by experts using their actual noses. However, scent data is exceedingly complex, and can frequently change over time: some scents are perceived immediately, while others linger in the air, creating many factors that need to be considered. Therefore, the data analysis process for prototyping and evaluating this technology was extremely time-consuming. NTT DATA is improving its calculation technology to perform the analysis instantaneously using NTT's LASOLV coherent Ising machine.

The efforts of our Quantum Computer/Next-Generation Architecture Lab Service are both domestic and global in scope, helping our clients grow their businesses in innovative ways by optimizing, streamlining, automating, and scheduling across all industries.



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# NTT DATA Technology Foresight 2023



# A Compass for the Present and Future of IT and Business

NTT DATA Technology Foresight serves as a compass, observing the current state of businesses that achieve continued growth through the maximum utilization of IT, based on extensive and objective information gathering to reveal future trends. The "INTRODUCTION" section reconfirms the relationship between business and IT, while the "TECHNOLOGY TRENDS" section details the direction in which IT is evolving and provides insight into future corporate strategies.

This report, directly related to our technology strategy, will help those who use IT to meet the many challenges of a rapidly changing and increasingly complex world.

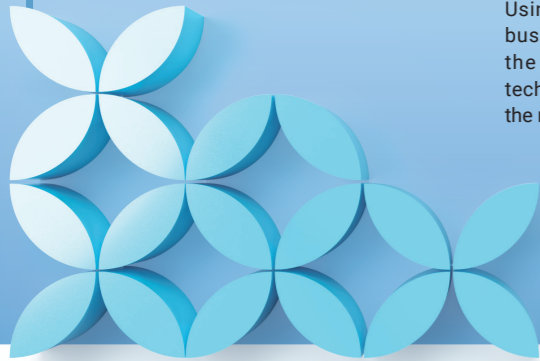
## INTRODUCTION

### Growth Driven by IT



IT drives and guides business. It is at the center of corporate activities, both as a touchpoint to provide customers with the best possible services and as a tool for rational decision-making based on the

accumulation of objective facts. In particular, AI supports advanced and intelligent decisions, changing how people work and do business. At the same time, IT also poses a risk around the world as a means to commit various crimes and destabilize society. Using case studies, we will reconfirm the business growth brought about by IT and the competitive capabilities created by technology, while seeking ways to address the negative aspects.



# 1

### Borders Transcended by IT



IT-driven businesses have the power to transcend existing business and industry barriers. Smart things change manufacturing and gather all kinds of service-oriented industries on the smartphone, leading to supremacy in competition. Companies

that excel in IT will be able to realize new forms of business, centering them in unprecedented divisions of labor and collaborative relationships. Such destruction will further grow trade areas and transcend future boundaries. We identify such border crossings and value transformations brought about by IT using case studies to seek out new opportunities and challenges.



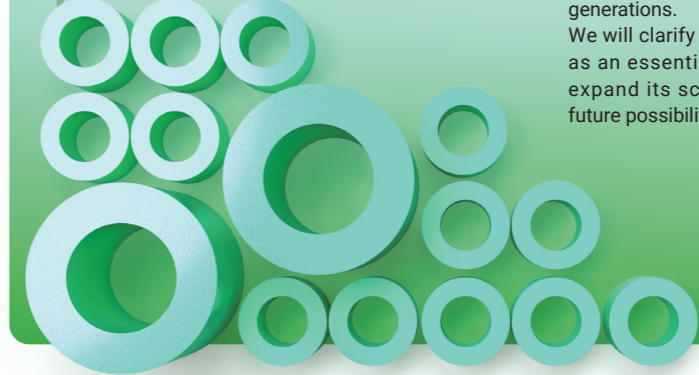
# 2

### The Future of IT



The continuation of an IT-driven society is a major challenge. The first challenge is maintaining technological innovations, the source of growth. Additionally, IT service companies will be expected to address new rules

to protect the global environment and integrates further with human society to gain more trust. As IT plays more and more fundamental roles in society, it will become further crucial to prove the origin of data handled by IT and preserve ballooning quantities of data ensure for future generations. We will clarify the initiatives where IT functions as an essential infrastructure in society and expand its scope of activities to explore its future possibilities.



# 3

## TECHNOLOGY TRENDS

### Growth-Supporting Mainstream Technology



A set of technologies that will support the continued growth of IT and determine when new utility businesses will materialize. We confirm its current status and foresee its direction.

- ◆ AI will enhance everything called "smart"
- ◆ Data condensation and software improvements will accelerate
- ◆ Clouds will engulf everything and transform the edges



# M

### Border-Transcending Growth Technology



Near-future growth technologies are undergoing trials and constantly evolving to secure new areas of differentiation. We foresee possibilities that are becoming increasingly apparent, as well as further evolutions.

- /// Earthly barriers are transcended using space infrastructure
- /// Robotics will achieve intelligence
- /// Virtual worlds will more fully integrate with people



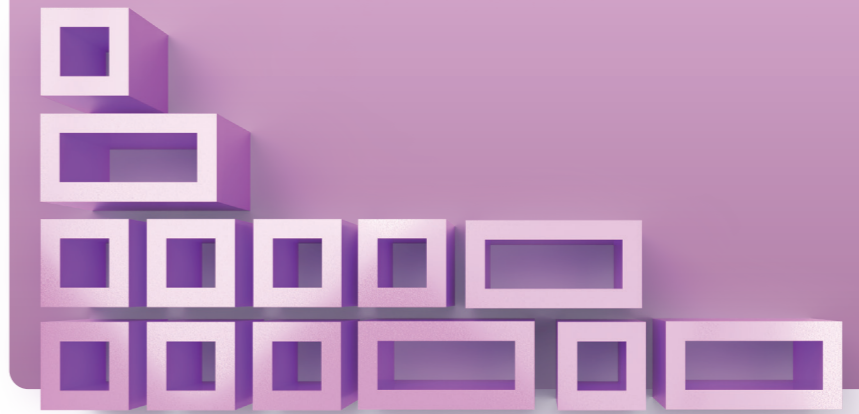
# G

### Future-Pioneering Emerging Technology



A number of elemental technologies that are beginning to show signs of materializing through efforts to explore innovative growth in the near future. We foresee their feasibility, and the potential extent of their destructive power.

- Next-gen computers will allow IT to continue taking the lead
- IT will make decarbonization a reality
- Bioinformatics will expand the future



# E