

Overview



Author: *Tetsuo Nakakawaji**

Innovation by IT Shall Realize Sustainable Societies

The progress of IT in recent years has been remarkable and has greatly changed society and life. As digital data and the Internet have spread widely, it has become possible to access various information from anywhere at any time. A closer observation of this trend reveals that it is evolving from IT to DX, or “Digital Transformation.”

The introduction of IT means streamlining the entire system and making it more efficient by converting information contained in tacit knowledge into digital information as explicit knowledge, storing it in a database, and exchanging it via networks. IT has enabled the manufacturing industry to visualize and streamline operations such as material procurement, processing and assembly production, and inventory and sales management, and to produce, ship, and sell large numbers of products with stable quality at low cost.

Although IT makes business more efficient, the effect is limited because the trend of improving business efficiency remains the same. It also tends to encourage mass production and mass consumption. In response, amid diversifying demand and environmental issues, the concepts of mass customization and subscription have emerged. The IT that supports this is what is called DX. The term “transformation” comes from the fact that full-scale use of IT, from consumer needs analysis to value chains, leads to revolutionary innovation that completely overturns existing values and frameworks.

In order to realize sustainable societies, IT is expected to be used not only for IT itself, but also for DX. This is because a sustainable society is hard to attain by conventional approaches such as improvements and reductions. A sustainable society can only be realized by making full use of all kinds of data, optimizing it in cyberspace, promoting the reuse of resources, and responding to diverse demands. For example, digital twin technology makes it possible to optimally build and control systems in physical space by aggregating information in cyberspace to reproduce and simulate events in physical space.

As an example, in the field of agriculture and food, the National Agriculture and Food Research Organization (NARO), to which the author belongs, is working to attain “Society 5.0 in the field of agriculture and food” by making full use of IT. This initiative is not limited to merely introducing IT that optimizes cultivation by measuring and analyzing water quantity and temperature information with sensors. In this initiative, NARO is challenging innovations such as designing crops that are resistant to climate change and disease, and designing food that is both healthy and delicious, by aggregating and integrating crop information such as genes and genomes, environmental information such as soil and weather, and information on diseases and pests to analyze them cross-sectionally using AI supercomputers before simulating and optimizing them in cyberspace.

Such efforts need to be made in all fields, including energy, transportation, disaster prevention and mitigation, medical care, education, and manufacturing. The key is big data. The word "big" here means both quantity and type; innovation is born by collecting a large amount of diverse data and integrating, analyzing and linking it cross-sectionally.

In order to realize a sustainable society through IT-based innovation, it is also important to integrate IT into organizations and businesses themselves. Since information is invisible, it is difficult for users to appreciate its cost. Companies and industries also need to reform their organizations and profit structures for information collection, integration, management, and utilization in order to achieve both economic development and to solve social issues. This is because without a structure that generates value as a business, the efforts of companies themselves will not be sustainable before attaining a sustainable society.

The more IT is used, the more value it creates. It is important to implement information processing functions without distinguishing between hardware and software, collaborate with various players through open innovation, and pursue value through agile innovation. It will also be necessary to deal with the negative aspects of the information society, such as security, privacy, and the digital divide.