Opening Article

Message from future generations*

—Now is the time to establish a direction and a philosophy for science

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How will future generations living in the 22nd century see people living in the current period? What kind of society can we, living in the present, pass on to future generations?

There is a saying "*Onko Chishin*" in the Analects of Confucius, meaning "exploring the past to know the new." So let's start by looking back to science and technology in the 20th century. In 1901, the First Nobel Prize Award Ceremony was held—the most fitting event for the dawn of the 20th century. These Prizes were established in accordance with the last will and testament of Alfred Bernhard Nobel, a chemist, engineer and businessman. He condemned himself for his invention of dynamite, which had begun to be used as a tool of war at the same time, and, for the welfare of mankind, left a will requesting the establishment of Nobel Prizes for outstanding achievements. On December 10, 1901, the anniversary of Nobel's death, the Nobel Prize in Chemistry was awarded to Jacobus H. van't Hoff, the Nobel Prize in Physics to Wilhelm Conrad Röntgen, and the Nobel Prize in Medicine to Emil von Behring. Since then, up to now (21st century), Nobel Prizes were awarded to about 800 people and organizations.

In 1992, the UNESCO-sponsored First World Conference of Science Journalists was held in Tokyo. On that occasion, a questionnaire survey was conducted on the participating 128 journalists from 28 countries around the world.

Table 1 Major headlines in 20th-century science and technology

1.	Development of nuclear bombs : atomic bombings of Hiroshima and Nagasaki (1945)
1.	The Apollo 11 moon landing (1969)
3.	Mapping of genes : discovery of the double-helix structure (1953)
4.	Invention and spread of computers
5.	Development of nuclear energy

Table 2 Outstanding scientists and engineers in the 20th century

1.	Albert Einstein (Pronouncement of the theory of relativity)
1.	James D. Watson and Francis Crick (Discovery of the double-helix structure of DNA)
3.	Sir Alexander Fleming (Discovery of penicillin)
4.	Werner Heisenberg (Discovery of the uncertainty principle, etc.)
5.	Marie and Pierre Curie (Discovery of radium, etc.)
5.	Niels H. David Bohr (Contribution to constructing quantum mechanics)

(Survey by Japanese Association of Science & Technology Journalists; Those under 6th are omitted.)

As indicated in the above tables, the 20th century can be said to have been the era of science and technology. Developed countries became rich and materially abundant. Conversely, mankind began to be saddled with negative legacies because the highest priority was given to the efficiency and desires of the existing generations and thus lacked the panoramic and permanent view of science and technology.

Although concepts such as "sustainable development" and "nation based on the creativity of science and technology" are correct, these words indicate neither a specific direction nor any philosophy. When it comes to science and technology for the 21st century, the pursuit of advanced knowledge is absolutely essential, but that is not enough. With consideration of "future generations" as the keyword during such processes, this author would like to desire a paradigm shift to be realized toward the direction of: (1) making an international contribution through development of the world's greatest technology and industries within such a scope as not to affect the "ecological system of life," with its life history of 3.7 billion years; and (2) resolving critical issues closely related to the survival of mankind, including nuclear technology, poverty, food, resources and global environment. If we develop science and technology in such a manner as to abandon the idea of co-existence and cycles, forget mother earth and nature, and pass on the burdens to future generations, such science and technology will be neither beautiful nor valuable. This point of view should be shared and deepened as a contemporary consciousness among scientists and engineers themselves.

According to etymology, "philosophia" means "to love wisdom." Wisdom should not be confined to Western thought, because there are a lot of ideas to be learnt from Eastern thought, such as "*Ware Tada Taru-wo Shiru*" which means "I only know the way to be satisfied with everything" and "*Chi Kou Gou-itsu*" which means "Awareness comes only through practice". The word "science" fundamentally means "knowledge" and includes not only natural science but also social science and humanities. What kind of message would future generations pose to present generations? Perhaps it would be "Promote new discoveries and inventions further, integrate interdisciplinary knowledge and philosophy, and ultimately resolve issues facing mankind, Japan, and the Earth."

* This main title was used in a video, "*Gunkanjima* Island and the Grand Shrine of *Ise*," which was coproduced with the KYOTO FORUM, etc. based on a sense of community during the NHK Creative.

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