

## Conclusion

This report has discussed the direction of the reform of S&T so that it will produce excellent results as the basis of innovation.

Since the beginning of the 21st century, Japan has produced nine Nobel laureates, including Shinya Yamanaka, M.D., Ph.D., a professor at Kyoto University who studies iPS cells. At present, Japan is undoubtedly one of the most successful S&T based nation. As has already been discussed, however, Japan is failing to keep up with the social changes surrounding S&T.

Nowadays countries are competing fiercely to ensure sustainable competitiveness through innovation. They have already begun investing resources and taking strategic measures to respond to these social changes and to create innovation. However, Japan is failing to keep up with this trend, neither.

There are several issues which the social changes surrounding S&T indicate.

The first issue is that people's needs become diversified and the pace of their ever-changing needs accelerates.

People around the world used to simply ask for high-performance and high-quality products, which Japan was good at manufacturing, but their needs have become more diversified and individualized. While some consumers want the least expensive, moderate quality products, other consumers value the specific character of the products that meet their individual preferences. Furthermore, people want to have enjoyable and memorable experiences rather than having high-quality goods; that is to say, people's interests are shifting from "what they own" to "how they feel." In the electronics field, for example, digitization and modularization have enabled many products to be made more easily and cheaper. Any manufacturer can easily make these products with a reasonable level of quality and at a low cost. As a result of this change, people are more interested in services than just products; for example, they are interested in the accompanying software and in design in the broadest sense of the word, including the appearance, concept and usability of products. The need to take the users' perspectives into account during the R&D is steadily growing.

In addition, the pace of changing needs has accelerated. This has created a serious risk; research is conducted on what is needed now, but when results are finally achieved, that need may no longer be there. Therefore, dialogue must be held not only with present users but also with future users, in order to anticipate vitally important needs and to take actions before others. As digitization has allowed emerging countries to catch up with the latest technologies more easily, the competitiveness gained by short-term technical development focused on present needs basically lacks sustainability. In contrast, the innovation that is created by anticipating future needs generally provides for sustainable competitiveness.

Accurately understanding these changes in societal needs will give us important insight into Japan's new innovation policies.

The second issue is that the distance between S&T and commercialization is decreasing.

Newly created, innovative technology seeds are now immediately commercialized, which cause global competition. Therefore, measures for developing an infrastructure for innovation, such as regulatory reform,

should be taken within a shorter period of time. Take, for example, the applications of iPS cells.

People in Japan became excited when Shinya Yamanaka, M.D., Ph.D., a professor at Kyoto University, received a Nobel Prize for his research on iPS cells. Then, the parties concerned quickly developed a support system. So far, the research and its commercialization have progressed smoothly. In addition, studies on age-related macular degeneration and cell sheet have also received proper support, and the studies have progressed to the stage of clinical trials. In a similar manner, as soon as a study has produced innovative results, any related studies should be carried out timely. A successful study in regenerative medicine, for example, needs to be immediately advanced into the stages of clinical trials and practical use. In order to realize that, rapid actions by concerned parties are indispensable. In fact, when expectations were running high that the iPS study would be commercialized after Professor Yamanaka had won the Nobel Prize, the Abe Cabinet advanced discussion on the regulatory reform of the Pharmaceutical Affairs Law at the Council for Regulatory Reform. Then, the cabinet decided to accelerate the commercialization of the iPS study. Thus, regulatory reform plays a key role in creating innovation.

Nations worldwide are competing to commercialize innovative technology seeds and to create innovation. All relevant ministries and agencies are required to continue responding quickly to the innovative results of S&T by carrying out innovation policies, such as regulatory reform, policy-based finance and government procurement, as well as research funding.

The third issue is that S&T itself is changing.

As has been described in this report, S&T itself has advanced more and more and has become rather sophisticated and complicated. It is therefore essential to promote intellectual exchanges among excellent researchers in various fields. While emerging countries continue to rise and international brain circulation is increasingly active worldwide, Japan has not taken sufficient measures yet. Therefore, all of the people who play a role in the S&T need to promptly examine each situation, reform their mindset to create innovation, and respond appropriately to the situation. This report has thus discussed the various efforts that should be made, including the following: research in new fields, challenges to high-risk research, the promotion of young researchers' activities, the promotion of the commercialization of research results, the utilization of overseas research resources through international brain circulation and the development of human resources who can lead innovation. Everyone concerned, in industry, academia and government, needs to reform their mindset.

Times are rapidly changing. Taking into account such changes, we must rouse ourselves and strive to carry out not only the science and technology policies but also other policies that may enable a wide range of innovations which are entirely different from previous innovations.

It is hoped that this report will help achieve this goal.