

Recommendation

Future Academic Advancement Initiative (2023)



25 September 2023
Science Council of Japan

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Executive Summary

1 Background

The Science Council of Japan (SCJ) has been making various efforts to embody the direction for reformation outlined in the "Towards a Better Role of the Science Council of Japan", which was compiled in April 2021. As one of the pillars for these reformations, we have been reviewing our activities with a particular emphasis on the "medium- and long-term perspectives, a comprehensive point of view, and cross-disciplinary studies", in order to meet society's expectations for the discovery of social issues from a broader perspective from an independent standpoint and propose how to respond to such issues from a medium- to long-term perspective envisioning future societies.

Looking around the world today, there is increasing importance for collaborative responses between academia and government, as well as growing expectations and interest in academia, science and technology, towards such attempts as sustainability, including carbon neutrality to control climate change as represented by global warming which is becoming more pronounced, and the response to people's lives in the global spread of unknown infectious diseases such as the novel coronavirus, etc. Under these circumstances, the SCJ has newly formulated the "Future Academic Advancement Initiative (2023) ", which is presented here as recommendations. It consists of multiple "grand visions" for academic advancement looking ahead to the next 20 to 30 years and "medium- to long-term scientific research strategies" which are necessary from the perspective of achieving these "grand visions".

By issuing this recommendation, it is expected that the direction to and the path toward medium- to long-term research will be reaffirmed in each academic field, and furthermore that research capabilities will be continuously developed in Japan is expected through revitalization of the entire academic community by exchanging the information and opinions between research communities, and thereby promotion to form new intellectual bases.

2 Background for the Formulation of "Future Academic Advancement Initiative (2023)"

In June 2022, the Subcommittee for the Promotion of Academic Research under the Committee for Scientific Community in the SCJ (hereinafter referred to as "the Subcommittee") published the "Policy for Formulation of the 'Future Academic Advancement Initiative'" and proceeded to formulate this recommendation in accordance with such policy.

The Subcommittee first solicited the proposals for a "medium- to long-term scientific research strategy" which consists of a "vision" for the promotion of science and a "scientific research concept" required for its realization. Proposers of a "medium- to long-term scientific research strategy" shall be either: i) heads of research and educational institutions or departments; ii) heads of academic societies; iii) members and associated members of the SCJ; or iv) young researchers. The submitted "medium- to long-term scientific research strategies" were reviewed and evaluated mainly by the "Working Group on Evaluation for the Future Academic Advancement Initiative" (hereinafter referred to as "the WG") established under the Subcommittee based on the "Review and Evaluation Process for the Formulation of the Future Academic Advancement Initiative and the Embodiment of the 'grand vision'" decided by the Subcommittee. The "vision", in particular, was reviewed and evaluated from two perspectives: i) the richness of the "vision" and ii) whether the scientific research concept is designed to realize the "vision". Additionally, the "scientific research concept" was evaluated from four perspectives: i) scientific significance or social value, ii) maturity, iii) superiority, and iv) necessity, and reviewed in terms of the importance and criticality to realize the associated "grand visions", respectively.

Based on the above-mentioned review and evaluation, the "medium- to long-term scientific research strategies" were categorized and classified into tentative groups that would contribute to the formulation of "grand visions". The Subcommittee and the WG created "grand visions" by not simply bundling together proposed "visions", but by examining them from a higher cross-disciplinary perspective, and determined a list of "medium- to long-term scientific research strategies" required to realize those "grand visions". The Subcommittee coordinated them, which has led to the issuing of this recommendation.

3 Grand Visions

The recommendation "Future Academic Advancement Initiative (2023)" consists of 19 "grand visions". When looking over these "grand visions", they cover a wide range of academic fields, such as academics that enrich our minds mainly in the humanities and social sciences, academics that analyze and conceptualize issues of our society, academics that provide dreams and new knowledge to mankind through the pursuit for truth in biology, physics, chemistry, and other fields, and academics like medicine and engineering that contribute to human health and a safe and enriched life by utilizing the knowledge systems of the above-mentioned fields. Many of them result from the fusion of academic disciplines, or the advancement of cutting-edge scholarship in a particular field that promotes the development of many other academic disciplines.

Each "grand vision" will initiate and promote future academic advancement as follows:

In academia centered on the humanities and social sciences, by actively utilizing science

and engineering, especially digital technology, we will build a data infrastructure while emphasizing conventional research methods, and advance academic research with transparency and fairness, which are shared domestically and internationally toward achieving the goal to promote coexistence, co-prosperity, and mutual understanding among countries and regions that make up the international community.

In the life science field, digital technology is also actively utilized, particularly in archiving research data and building databases. The use of digital technology will also greatly contribute to scientific fields related to food supply including agriculture, and planetary boundaries as the limits of the earth's capacities in terms of climate change due to global warming. In addition, by promoting a comprehensive understanding of life phenomena, academics related to precision medicine, drug discovery, and one-health will create a healthy and happy biological world, that is, true well-being on Earth.

Progress of academics on the generation of energy and its utilization, the development of innovative substances and materials, and the academics on the recycling of resources will also contribute to realization of a sustainable society.

Information technology including digital technology itself will further evolve. As physical space is reproduced in cyber space and a close link is established between both spaces, human capabilities will be expanded in order through symbiosis between artificial intelligence and humans. In addition, it will advance academics of quantum information science where physics and information are unified in a new way.

It is expected that we will make further progress in cutting-edge academics centered on physics. Quantum beam is an effective tool not only to explore the origin of matter, but also to widely explore the nature and structure of matter in materials science and life sciences. The exploration of the birth and evolution of celestial objects in the universe, including the exploration of the solar system, will help us to explore the origin of diversity of astrophysical objects and structures, and at the same time help to advance the science to elucidate the universality of life. In addition, by making full use of theoretical physics and the latest computational science, we will discover new fundamental principles of the natural world that transcend the known laws of physics and advance the science that elucidates the origin of the universe and matter. These are not only the pursuit of truth, but also an attempt to understand the nature of human beings on the earth.

4 Conclusion

In formulating the recommendation "Future Academic Advancement Initiative (2023)", we have emphasized a bottom-up approach based on the initiatives of scientific communities and requested proposals of "medium- to long-term scientific research strategies" respectively. The compilation process is featured by the method that "visions" in each proposal were not simply bundled together but were further examined from a

cross-disciplinary perspective of higher level, and finally clarified into 19 "grand visions". Additionally, the "medium- to long-term scientific research strategies" necessary to realize these visions are concretely presented in the Appendix.

It is believed that the knowledge of truths and facts on nature and human beings acquired by promoting the "grand vision" outlined in this recommendation and the results realized through the pursuit and application of such knowledge will make an enormous contribution to the Earth and human society.

We make this recommendation, hoping that it will serve as a guideline for the promotion of various academic fields in Japan, and that they will be utilized in academic policies, as well as in specific measures and budget measures by the relevant ministries and agencies, universities, and other research and educational institutions.

As this is the first attempt to formulate such a recommendation using this method, some challenges remain that require continued consideration on the areas and issues not covered in this recommendation. For example, it is necessary to add new "grand visions" and new "visions" that comprise the "grand vision". Furthermore, for some proposals, only the "visions" have been adopted, so it is desirable to further enhance the "scientific research concepts" to realize each "vision". Therefore, along with continuing to making up these incomplete parts, "scientific research concepts" should be updated at an appropriate time in the future in accordance with scientific progress and changes in society and the environment.

In order to realize the "grand visions" outlined in this recommendation, it should be noted that analysis and examination based on the humanities and social sciences which are related to people's lives and the state of society, economy, and industry is essential in the pursuit for truth and application of its knowledge systems, especially in fields of science, engineering, and life sciences.