

Overview

Establishing an Innovation Ecosystem for a Human-centric Society

Shinji Yamada, Ph.D.

1. Strategy of the Center for Exploratory Research

In an era when the future could be anticipated by extrapolating trends, products and wealth were built up through improvements in products and services. However, this has ushered in an “age of uncertainty” that has lost sight of how to go about resolving the concerns of individuals, companies, and society. Japan has put forward its Society 5.0 vision based on the concept of delivering both economic growth and solutions to social issues, and has been promoting it internationally at venues such as the World Economic Forum Annual Davos Meeting and the Group of Seven (G7) Science & Technology Ministers’ Meeting. Japan has also embarked on debate about strategies for growth based on realizing Society 5.0 in the Council on Investments for the Future, which was established with the aim of serving as a new vantage point for energizing growth strategies.

The Center for Exploratory Research is coordinating with Society 5.0 to take on the challenge of achieving a human-centric society that, rather than just science and technology, ties in with real society and ways of life, where products and wealth are treated not as ends in themselves, but rather as mechanisms for delivering the outcomes and well-being that are people’s individual and collective reasons for living. Open innovation is essential to achieving this, by establishing an ecosystem of total innovation that

extends beyond the boundaries of the company. The Center for Exploratory Research is actively utilizing open innovation to promote the rapid incubation of Social Innovation that will resolve social issues.

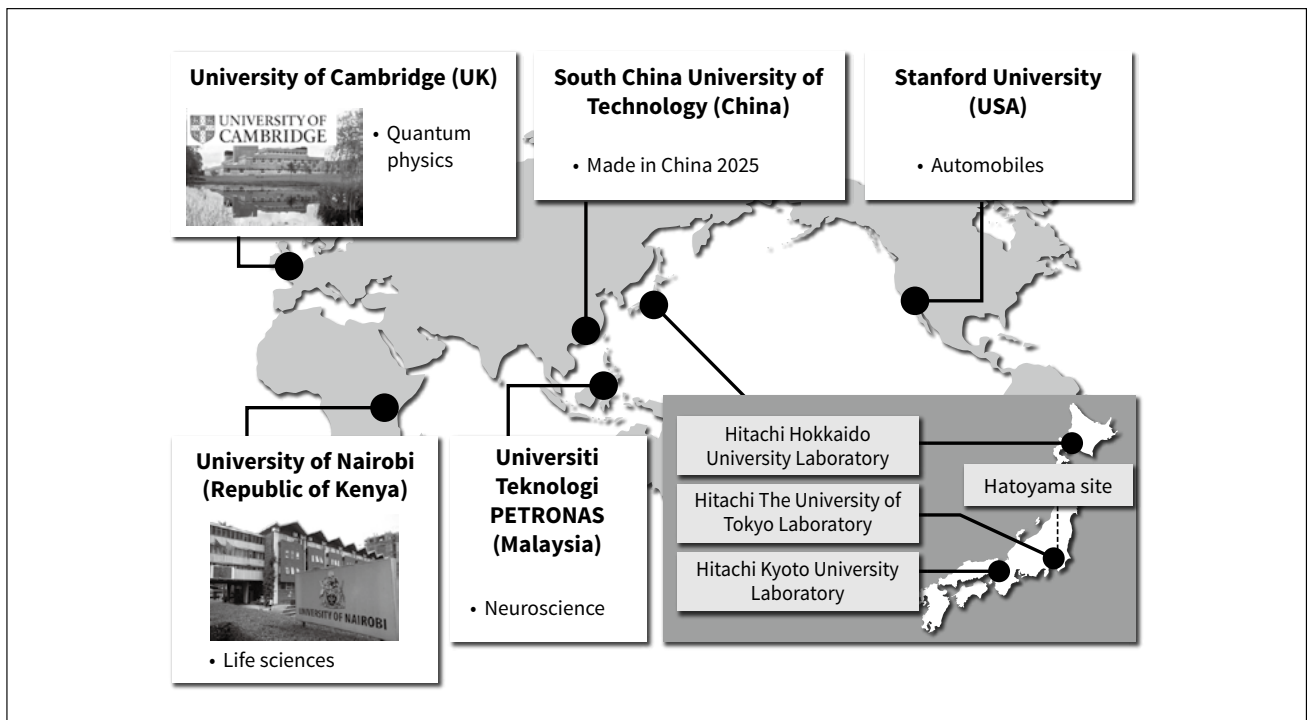
2. Open Innovation

There is a limit to what one company can do on its own in a society that has become more complex in this age of uncertainty. The Center for Exploratory Research draws on networks that link to the wisdom of universities and society, and collaborates with a variety of stakeholders to progress rapidly from vision creation to practical implementation in society. It serves as a hub for close collaboration with universities and uses this as a unifying force for building an innovation ecosystem that brings together a wide range of people and organizations encompassing companies and incubators, as well as national and local governments.

Joint research sites were established at The University of Tokyo, Kyoto University, and Hokkaido University in June 2016 to serve as hubs in this network. Hitachi The University of Tokyo Laboratory is working on vision creation and scenario formulation in fields such as future cities and energy, based on the accumulation of knowledge about the nation and society, with the aim of realizing Society 5.0. Hitachi Kyoto University Laboratory takes a long-term perspective emphasizing the fundamentals and academic theory, and is using an understanding of humans and

Figure 1 — University Joint Research Sites

The Center for Exploratory Research has established joint research sites at universities in Japan and elsewhere to engage in open innovation.



culture as a basis for researching the social issues of the future. Hitachi Hokkaido University Laboratory is tackling the challenges directly facing Hokkaido through preemptive trials of solutions in a region at the forefront of these challenges. In February 2017, the network was expanded beyond Japan with the establishment of a facility for conducting joint international research into neuroscience applications based on optical topography with the Universiti Teknologi PETRONAS in Malaysia⁽¹⁾ (see **Figure 1**).

In the future, the Hatoyama site, which promotes openness to facilities outside Hitachi, will serve as a network hub that both binds together facilities inside and outside Japan and works jointly with a variety of stakeholders on practical implementations in society.

3. Taking on Social Issues

The Center for Exploratory Research is using open innovation to work on research aimed at resolving the social issues of the future in four different fields: information sciences, life sciences, physical sciences, and frontiers. The following summarizes the research topics in each field (see **Figure 2**).

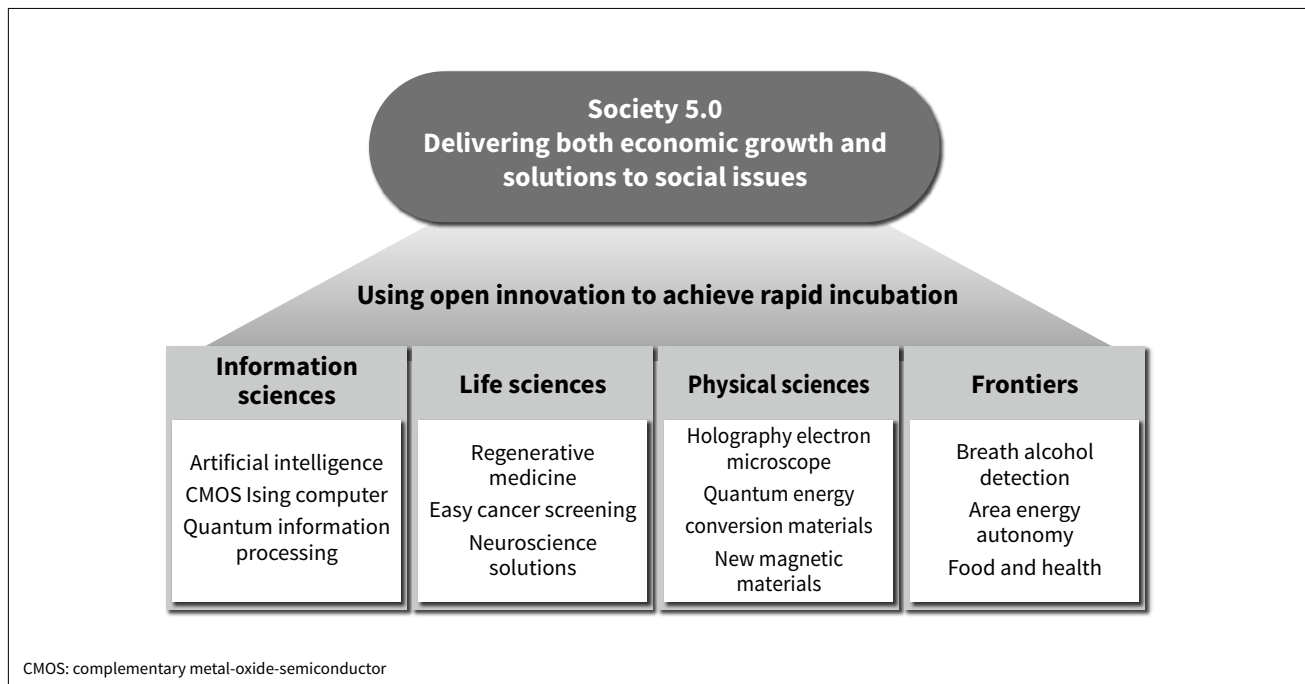
In the field of information sciences, research is being pursued on the practical implementation of a new type of semiconductor computer that uses an Ising model, and has successfully developed technology that provides a 10-fold increase in the scale of computing capabilities by having multiple elements share computing circuits and random number generators as well as a preprocessing algorithm that automatically converts the complex interconnections between elements into a regular structure^{(2), (3)}.

In the field of life sciences, research is being conducted on developing technology that identifies metabolite differences in urine between people who are healthy, people with breast cancer, and people with colorectal cancer. Hitachi believes that increasing cancer screening opportunities by making it easily available to patients can help control social security costs, including healthcare costs⁽⁴⁾.

In the physical sciences, the Center for Exploratory Research is participating in discussion on the possibilities of holography microscopes as well as boosting international collaboration aimed at utilizing an atomic-resolution holography electron microscope that has achieved the world's highest (as of February 18, 2015) point resolution of 43 pm⁽⁵⁾, with the

Figure 2 — Taking on Social Issues in Four Fields of Research

The Center for Exploratory Research is utilizing open innovation to achieve rapid incubation.



Hatoyama site serving as the venue for an international workshop, Electron Holography Workshop 2017, held by the Ministry of Education, Culture, Sports, Science and Technology in February 2017.

In the field of frontiers, the center is working with Honda Motor Co., Ltd. on the development of a breath alcohol sensor. By expediting the development and practical implementation in society of a portable breath alcohol testing device that supports smart keys, this initiative is aimed at helping reach the target of zero injuries due to drunk driving⁽⁶⁾.

4. Active Personnel Exchanges

The Center for Exploratory Research is taking advantage of a variety of opportunities to establish a human resources network. Examples include hosting stakeholder dialogues where experts from universities and companies are invited to discuss the social acceptability of the new technologies they are working on.

The center also collaborates with students to create ideas by drawing on their flexible thinking and values. The prototyping of robots that incorporate artificial intelligence (AI) includes working on programming with technology circles at universities. The

center is also participating in brainstorming and active discussion about the future of AI at Hitachi Kyoto University Laboratory.

5. Conclusions

The Center for Exploratory Research will continue pursuing the rapid incubation of future Social Innovations by establishing and utilizing networks in Japan and elsewhere.

Acknowledgments

Some of the research introduced in this article received support from the Acceleration Transformative Research for Medical innovation (ACT-M) of the Japan Agency for Medical Research and Development (AMED), and was undertaken through the Advanced Research Infrastructure Joint Promotion Project (a support program for establishing shared platforms) of the Ministry of Education, Culture, Sports, Science and Technology.

References

- 1) Hitachi News Release, “Universiti Teknologi PETRONAS and Hitachi launch a research hub to promote global collaboration in Applied Brain Science for Optical Topography,” (Feb. 2017), <http://www.hitachi.com/New/cnews/month/2017/02/170214.html>
- 2) Hitachi News Release, “Toward the Practical Realization of New Type of Semiconductor Computer, Development of Preprocessing Algorithm that Automatically Converts Difficult Connections between Elements into a Regular Structure,” (Jun. 2016), <http://www.hitachi.co.jp/New/cnews/month/2016/06/0621a.html> in Japanese.
- 3) Hitachi News Release, “Development of Technology that Achieves 10-fold Increase in Computational Scale for New Type of Semiconductor Computer,” (Nov. 2016), <http://www.hitachi.co.jp/New/cnews/month/2016/11/1122a.html> in Japanese.
- 4) Hitachi News Release, “Successful Identification of Metabolite Differences in Urine between Healthy, Breast Cancer and Colorectal Cancer Groups,” (Jun. 2016), <http://www.hitachi.com/New/cnews/month/2016/06/160614a.html>
- 5) Hitachi News Release, “Development of an Atomic-resolution Holography Electron Microscope with the World’s Highest Point Resolution (43 picometers),” (Feb. 2015), <http://www.hitachi.com/New/cnews/month/2015/02/150218.html>
- 6) Hitachi News Release, “Hitachi and Honda Successfully Develop Prototype of Portable Breath-based Alcohol Detection Device for Vehicle Smart Keys,” (Mar. 2016), <http://www.hitachi.com/New/cnews/month/2016/03/160324b.html>

Author



Shinji Yamada, Ph.D.

General Manager, Center for Exploratory Research, Research & Development Group, Hitachi, Ltd. *Society memberships:* The Chemical Society of Japan (CSJ) and the Society of Nano Science and Technology.