

Category Overview

Pioneering New Frontiers for Future Social Innovation —Center for Exploratory Research—

ROLE OF CENTER FOR EXPLORATORY RESEARCH

THE role of the Center for Exploratory Research is to identify research topics that will help overcome the challenges that society will face in the future, to undertake leading-edge research and development from a long-term perspective, and also to create future opportunities for the Social Innovation Business by working as a global open laboratory with research institutions around the world.

To ensure the ongoing growth of society, customers, and Hitachi, it is important to undertake research based on an innovative vision that addresses both the inescapable societal challenges that have already become apparent, and those unknown challenges for the future of which society and customers are not yet aware. Having formulated a vision of “transforming social systems by pioneering new frontiers through exploratory basic research,” the Center for Exploratory Research has embarked on the following two missions (see Fig. 1).

(1) Serve as hub for a network of basic research

Establishing a network that encompasses leading

research institutions and top researchers is essential to the formulation and realization of the center’s vision. Accordingly, it intends to adopt a rigorous approach to open innovation and expand its research network through links with the world’s leading researchers forged by making available its own leading-edge research facilities, proprietary technologies, and other resources. It also aims to become an influential organization that can coordinate national projects and consortiums and contribute to policy.

(2) Take up the challenge of creating a new Social Innovation Business

The center will anticipate the true nature of future societal challenges and pioneer new businesses without being restricted to its current scope of activities. This involves collaborative creation with non-Hitachi institutions to uncover advanced societal challenges, and undertaking proof of concept (PoC) projects to present social impact and value. It also includes working to build the future Social Innovation Business through collaboration with the Global Center for Social Innovation and Center for Technology Innovation.

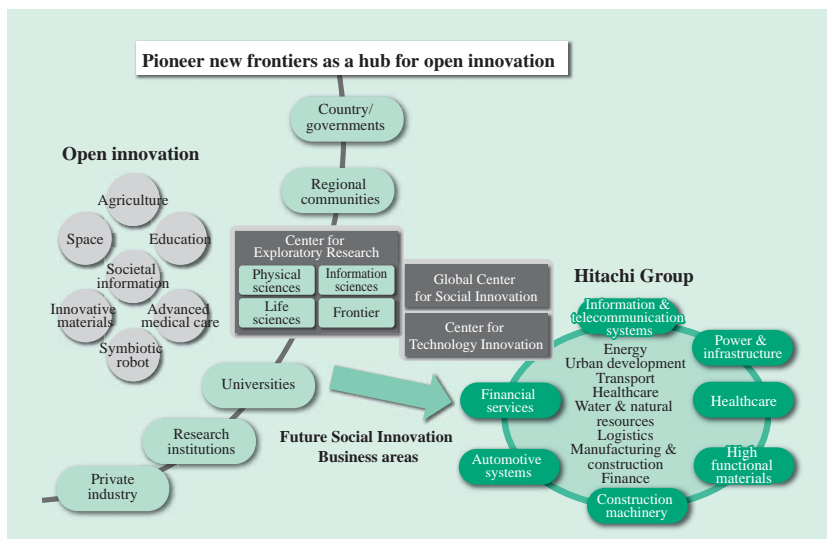


Fig. 1—Center for Exploratory Research. The role of the Center for Exploratory Research is to serve as the hub for a basic research network, forge links with universities and external research institutions, and create future opportunities for the Social Innovation Business.

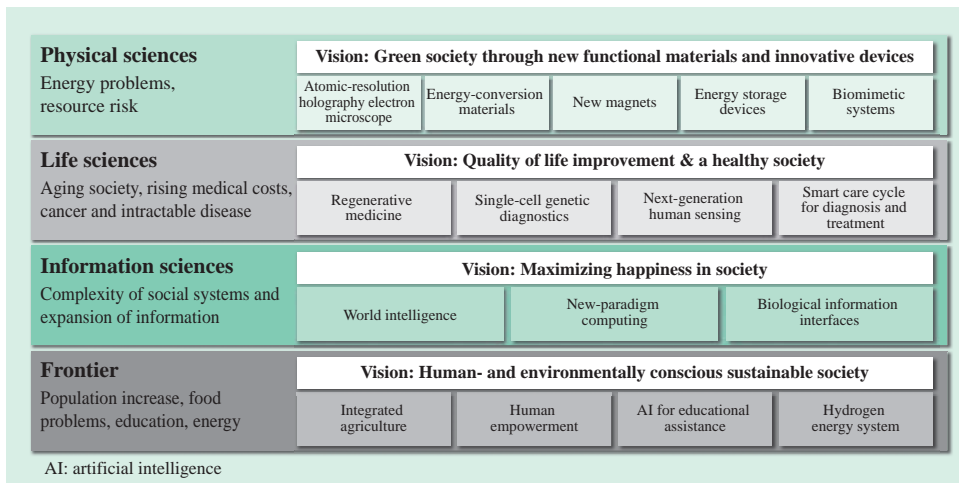


Fig. 2—Research Fields of Center for Exploratory Research.
The Center for Exploratory Research conducts research into four fields: the physical sciences, life sciences, information sciences, and the “frontier” field.

ORGANIZATION AND RESEARCH TOPICS

The Center for Exploratory Research has created a flexible and dynamic research organization by adopting a flat structure in which all projects report directly to the General Manager. Research is divided into four fields: physical sciences, life sciences, information sciences, and “frontier,” with each field being fronted by a chief scientist who acts as the “face of Hitachi” and who leads research in that field. The following sections describe each of these fields in turn (see Fig. 2).

Physical Sciences

With a vision of “creating a green society through new functional materials and innovative devices,” the center’s work on physical science will involve the use of advanced measurement techniques to elucidate physical phenomena and develop new materials, and research into devices based on new principles and the systems that use them. Through these activities, the center aims to be a world leader in basic research, and to realize a green and ecological society through the creation of innovative materials and device systems. For example, the center aims to link up with physical science researchers from around the world to work on elucidating poorly understood physical phenomena by utilizing the ability of the atomic-resolution holography electron microscope⁽¹⁾ to observe magnetic fields with atomic resolution. This includes transforming the process of materials development by using the technology to study the principles that govern the material properties of magnets, energy-conversion and storage materials, and so on.

Life Sciences

In the life sciences, the center is pursuing a vision of “quality of life improvement & a healthy society.” This involves working on research in the fields of regenerative medicine, single-cell genetic diagnostics, next-generation human sensing, and smart care cycles for diagnosis and treatment that seeks to overcome such challenges as the aging society, rising medical costs, cancer, and intractable disease. In the case of research into regenerative medicine, for example, the center is seeking to transform healthcare and create a healthy society by deploying an automated cell culture technique⁽²⁾ jointly developed with Tokyo Women’s Medical University for the automatic culturing of induced pluripotent stem (iPS) cells, as well as through comprehensive work in this field. With regenerative medicine expected to grow into a 17-trillion yen market by 2030, the center is also working on developing technologies that will make Hitachi a major player in this field.

Information Sciences

In the information sciences, the center is pursuing a vision of “maximizing happiness in society via artificial intelligence (AI) for assisting education” by working on research into “world intelligence,” new-paradigm computing, and biological information interfaces to deal with challenges that include increasingly complex social systems and the expansion of information. “World intelligence” seeks to resolve complex societal challenges by using a harmonious combination of social science and artificial intelligence to drive the co-evolution of people, organizations, and artificial intelligences⁽³⁾.

In the field of new-paradigm computing, the center is researching new computing concepts that can obtain rapid solutions to optimization problems for complex social infrastructure systems that would take a very long time to solve using conventional computing⁽⁴⁾.

Frontier

In the “frontier” field, the center has a vision of “realizing a human- and environmentally conscious sustainable society,” and is working on research into integrated agricultural production practices, human empowerment, AI for educational assistance, and a hydrogen energy system. Work in these fields involves seeking to overcome challenges such as population increase, food supply problems, education, and energy that society will face in the future by combining technologies from a variety of scientific disciplines.

FUTURE ACTIVITIES

In the future, the Center for Exploratory Research aims to deepen its links with leading researchers and with other non-Hitachi research institutions in Japan and overseas based around its one-off measurement instruments such as the atomic-resolution holography electron microscope, and its proprietary technologies such as automated cell culturing, human big data analytics, and Ising computers. Along with progress on establishing a basic research network, the center also intends to boost Hitachi’s presence by taking a stronger stance on presenting its vision and research results outside the company. Through these initiatives, the center aims to pioneer new frontiers and build the future Social Innovation Business.

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