New Global R&D Organization for Customer-oriented Innovations

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HITACHI undertook a major restructuring of its R&D organization in April 2015 to create a structure based on three innovation models that would facilitate the operation of its Social Innovation Business, which uses a fusion of infrastructure technology and IT to overcome the challenges facing customers and other parts of society. This reorganization marks a switch from a "product out" to a "market in" model, and will strengthen R&D that targets innovations that go beyond the development of individual technologies. This will create a customer-oriented global R&D organization in which researchers work with customers on the collaborative creation of solutions underpinned by a wide range of technical fields and research resources.

Handling Collaborative Creation with Customer through Global Organization

Nagai: I am a Professor of the School of Knowledge Science, Japan Advanced Institute of Science and Technology (JAIST), specializing in subjects such as innovation design. With Hitachi having restructured its research and development (R&D) organization in April 2015, I would like to talk to you today about the reforms you are undertaking to generate innovation, while also touching on my own academic interests.

Hitachi has consolidated its R&D into three organizations, one of which is its Global Center for Social Innovation. Can you please explain the role of this organization?

Suzuki: In the recent organizational change, our research facilities in Japan and overseas were realigned under three different innovation models, namely collaborative creation with customers, technology innovation, and exploratory research. The Global Center for Social Innovation is the organization responsible for collaborative creation. We are the frontline research organization working with customers to identify challenges and seek solutions, and as the "Global" in our name indicates, we represent a global organization that includes the overseas research facilities. Collaborative creation with customers involves three steps. Firstly, we work with customers to identify areas in which they are being challenged and draw a shared vision towards which we will work by resolving issues. Next, we clarify the concept based on this vision

and develop a prototype. The prototype is then tested for proof of concept at the customer site before taking it to market and creating a solution.

Nagai: While customer-oriented development is nothing new at Hitachi, I understand this is about formalizing this approach?

Suzuki: Yes, that is correct. The Design Division was the research organization responsible for usability assessment, ethnographic research and other methodologies based on social sciences to design products and services. The new Global Center for Social Innovation was formed by integrating the Design Division together with the research team working on service design at our Yokohama Research Laboratory and other research teams who were delivering technologies and solutions to customers. By assigning researchers with service design skills close to customers both in and outside of Japan, and by augmenting this with staff who understand and can propose technology, solution proposals through collaborative creation will be accelerated.

Nagai: Please tell me about your global strategy.

Suzuki: We are operating through four regional centers to capture region-specific needs: Tokyo (Asia-Pacific), North America, China and Europe. Each center will focus delivering solutions to regional challenges: North America, through advanced solutions based on big data analytics platforms; China, through solutions addressing new industrial policies in China such as new forms of urbanization and low-carbon society, and Europe, through solutions to common challenges facing

a matured society such as aging infrastructure and decreasing population. Solution development will involve the regional centers integrating solutions according to the challenges and needs of their respective regions based on technology platforms developed by the Center for Technology Innovation. To achieve this, we are fortifying research related to service and solution design, and intend to support Social Innovation Business worldwide through collaborative creation with customers in each region.

Nagai: I recognize that developing scenarios of desirable futures is essential to achieving social innovation. How do you deal with this?

Suzuki: We intend to deploy service design techniques for collaborative creation such as the NEXPERIENCE / Opportunity Finding and vision design. The NEXPERIENCE / Opportunity Finding is a way of predicting societal trends by studying citizens in a particular country or region from the perspective politics, economics, society, and technology (PEST), and assess how peoples' values change by considering how these factors interact with each other as they change over time. These predictions provide a basis to develop and test revolutionary prototypes and deliver solutions, using the diverse technology platforms of the Center for Technology Innovation and the advanced technologies of the Center for Exploratory Research.

Seeking to Achieve Technology Innovation that Originates with Customers

Nagai: The role of the Center for Technology Innovation within Hitachi's new R&D organization is to deal with technology innovation. What will be its innovation strategy?

Nishino: The mission of the Center for Technology Innovation is to develop innovative products and services by combining different types of technology. To achieve this, we have restructured our overall organization along technology lines that transcend the boundaries between our previous research laboratories by establishing nine Centers for Technology Innovation to work in the fields of Energy, Electronics, Mechanical Engineering, Materials, Systems Engineering, Information and Telecommunications, Controls, Production Engineering, and Healthcare, respectively. Because the creation of innovative products in recent years has required the combination of technologies from various different fields, organizing along technology category lines rather than by laboratory helps facilitate this process. The key role of the Center for Technology Innovation is to deliver technology-oriented solutions by concentrating on specific fields to strengthen individual technologies. However, while they are technology-oriented, a key feature of the centers is that they do not adopt a "product out" approach, rather they deal primarily with technology innovation that originates with customers, while also deepening their relationship with the Global Center for Social Innovation, which acts as the customer-facing organization.

Nagai: Can you provide any examples of this combination of technologies?

Nishino: Development that matches customer needs, such as rolling stock that is not only fast but also provides high levels of ride comfort and safety, for example, invariably requires a combination of technologies. This includes the growing importance of open innovation, involving the incorporation of technologies, not just from within Hitachi, but also from external sources. For example, Hitachi supplies proton beam cancer therapy systems that utilize technologies for particle accelerators and beams. To develop these

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Joined Hitachi, Ltd. in 1986 as a researcher working in digital image signal processing and embedded systems. Dr. Suzuki has held various positions including head of the R&D Division of Hitachi America, Ltd., before being appointed to his current position in April 2015. Dr. Suzuki is a member of The Institute of Image Information and Television Engineers, IEICE and the IEEE.

further, we are working on R&D* that incorporates the realtime tumor tracking radiotherapy technique developed jointly with Hokkaido University and funded by the government's Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST Program).

Yamaashi: Various forms of new value have been created through the combination of different technologies or applications that cross multiple fields. One example is the contribution to dramatic advances in semiconductor technology made by the use in semiconductor testing systems of world-leading electron microscopes, a subject that Hitachi has been researching since as far back as the 1940s. We have also brought innovations to the medical field by using advanced image processing techniques developed for television in diagnostic ultrasound imaging systems to provide realtime, three-dimensional imaging of fetuses or of the heart, or other organs. We have also produced new solutions by using image processing techniques in such systems as those for security and for the remote monitoring of machinery operation. Having technical capabilities that cover a wide range of fields is one of Hitachi's strengths, and our aim is to draw on this strength to contribute to overcoming a greater number of societal challenges.

Formalizing Hitachi's Technology Portfolio so that it Can be Put to Use

Nagai: While the value of a technology comes about after going through a process of enhancement and refinement, there are many technologies that never make it to market. Nevertheless, extremely valuable technical knowledge is created in the process and built up over time. If this knowledge can be put to use

satisfying new requirements, then new ways forward can be found. Such applications and fusions of technology represent a genuinely new approach to technology development.

Yamaashi: As advanced technology from one field should also have applications elsewhere, the key question becomes how to identify such pathways. The technology we develop is our wealth, and our aim is to deliver this wealth to as many customers as possible in ways that are of value to them.

Nishino: While Hitachi has been building up core technologies through the process of product development ever since the 5 HP induction motor we developed in 1910, these technologies have not always been organized into a formal structure. I believe that formalizing group technologies in the form of technology platforms as we are currently doing will not only make it easier to establish strategies for enhancing our technology from the perspective of a broad overview, it will also encourage the use of this technology.

Nagai: If idle technology can be put to use, we can expect to see a steady stream of new developments emerging synergistically. Establishing the capabilities to create a comfortable and prosperous society by putting together numerous requirements with their potential solutions will also make consumers like myself happy.

Suzuki: From the perspective of the Global Center for Social Innovation, organizing the technology platforms of the Center for Technology Innovation into a formal structure and making these visible to overseas R&D operations is of particular significance. I anticipate that this will lead to new discoveries as people realize that

* Utilizes the results of "Advanced Radiation Therapy Project: Real-time Tumor-tracking with Molecular Imaging Technique" program (Principal Investigator: Professor Hiroki Shirato of the Graduate School of Medicine, Hokkaido University), which ran from March 2010 to March 2014 under the Japanese Cabinet Office's FIRST Program.

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Joined Hitachi, Ltd. in 1985. After working on the development of nuclear power plants, water supply and sewage treatment technology, and control systems for chemical and pharmaceutical plants, and at the Technology Strategy Office, he was appointed to his current position in April 2015. Dr. Nishino is a member of The Japan Society of Mechanical Engineers (JSME), The Society of Chemical Engineers, Japan (SCEJ), the Society of Instrument and Control Engineers (SICE), and the Atomic Energy Society of Japan (AESJ).

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particular technologies can be used to satisfy the needs of customers which vary by region.

Finding Solutions to Upcoming Challenges as a Means of Future Innovation

Nagai: I understand the role of the Center for Exploratory Research is to undertake exploratory research. Is this somehow different from the world of Advanced Research Laboratory?

Yamada: Basic research in the past has tended to focus on investigating one particular topic at a time. It was a leisurely approach. The Center for Exploratory Research, however, was established based on the idea that dealing with the most pressing issues facing global society demands an exploratory model of basic research that takes a more diverse and interactive approach to these challenges and to communicating its results. In terms of time frames, one point of difference from the Global Center for Social Innovation and Center for Technology Innovation is that the Center for Exploratory Research considers social trends that stretch farther into the future and undertakes research with the aim of achieving innovation in the future. In terms of our scope of research, we also intend to work on cross-disciplinary activities that are not covered by the individual technology platforms and research topics of the Center for Technology Innovation, as well as on new fields. Specifically, we have defined four areas of activity for our more than 100 researchers, namely physical sciences, life sciences, information sciences, and "frontier."

To get the maximum output from a small number of people, we have adopted "open innovation" as the basis of our approach to research, involving collaboration with universities, public research institutions, and other companies. We are also aware of the need to be able to determine how much value the outcomes of our research are providing to society, and have taken steps to ensure this. We aim to work with the government, local communities, and others to solve the challenges that society will face in the future, and to be an open research institution that articulates a distinctive vision and pioneers new fields.

Nagai: In a select group, individual researchers can play a major role. Do you take any special steps to improve motivation?

Yamada: Along with having a staff of people with very strong research capabilities and people who excel at coordination, the organization has a flat management structure in which project teams report directly to the center manager. Highly experienced chief scientists also provide inspiration. I believe this enables prompt decision-making and provides the flexibility for teams to join or work together and make the most of their respective capabilities.

Nagai: It seems to me that targeting future innovation demands a high-level perspective that involves the building of a vision.

Yamada: As the Center for Exploratory Research is not a particularly large organization, rather than setting out to plan the future by ourselves, we are building a distinctive vision through activities such as committee work and involvement in national projects based on an awareness of long-term national policy and societal challenges. Meanwhile, there is also value in challenges for the not-so-distant future that are in the process of happening now and have been raised by organizations such as the Global Center for Social Innovation and Center for Technology Innovation. In any case, a deep understanding and knowledge of science remains the essential basis for innovation. While there are the

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differences from past basic research that we talked about earlier, the emphasis on science is something we intend to maintain.

Nagai: While diversity is recognized as a strength in design thinking, one of my own areas of research, no doubt you also emphasize breadth in exploratory research. What form do you see this "breadth" taking in terms of the topics for research at the Center for Exploratory Research?

Yamada: While seeking to uncover the true nature of phenomena is essential to obtaining a deeper understanding of science, when the information and life sciences are brought into the mix, a need also arises to consider the true nature of people and society. With the human sciences increasing in importance, I have a sense that the scope of research is expanding. By selecting topics for study from this broader perspective, we aim to perform innovative research.

Toward R&D that Designs Innovations

Nagai: I get the impression that, by restructuring into three organizations, you have expanded the potential for R&D at Hitachi.

Yamaashi: That's right. With the Global Center for Social Innovation working alongside customers on the collaborative creation of solutions, the Center for Exploratory Research seeking out future value through open innovation, and the Center for Technology Innovation creating the necessary technologies, the R&D organization is able to work together or in complementary ways under these three distinct visions, giving us an ideal organizational structure for facilitating the global expansion of Hitachi's Social Innovation Business. In the future, we also aim to create a greater sense of unity by encouraging personnel exchanges between the organizations as part of specific projects or other activities.

Nagai: Hitachi is engaged in a transformation throughout its operations to better equip itself for future growth and innovation. How is R&D participating in this process?

Suzuki: My particular focus is to firmly establish global operations. As Hitachi's management shifts toward greater autonomy in regional decision-making, our first priority is to establish a framework for R&D and business divisions in each region to work together as one to deliver solutions. The Global Center for Social Innovation will further evolve to enable Hitachi to play a central role in taking on the challenges faced by specific regional communities and the global community.

Nishino: The focus for the Center for Technology

Innovation is the development of "number one" technologies, products, and solutions. This use of the term "number one" is not boastfulness, rather it means we are seeking to deliver value in a form that customers genuinely want through the rigorous adoption of customer-oriented practices.

Yamaashi: To achieve this, in addition to keeping pace with rapidly changing technology trends, I believe we also need to be selective and focused in deciding which technologies we should enhance further, and where we should introduce technologies from other companies, while at the same time collaborating with the Global Center for Social Innovation and Center for Exploratory Research. From the perspective of social innovation, unifying and revising technology platforms from throughout Hitachi is also one of the major objectives of this current restructuring.

Yamada: As it works toward future innovation, I hope to see the Center for Exploratory Research become a source of pleasant surprises. A major aim of the center is for it to become a hub for exploratory research both in Japan and further afield. By working with key opinion leaders in a variety of fields and establishing research clusters, it will come to play a central role in the world of exploratory research.

Nagai: As I see it, this reorganization of R&D at Hitachi is a genuine example of innovation design. It is establishing an organizational structure based on a clear vision and in which everyone concerned can feel personally involved. While that is easy to say, there are few organizations that have actually achieved it.

At JAIST, we are going through a reorganization based on the two core concepts of service science and innovation design that is aimed at leading the process of identifying the needs of the future and delivering innovations from the Hokuriku region, which is a fertile soil for culture and technology. Today's discussion has left me with some valuable ideas for our own organizational reforms. The reforms at Hitachi look set to provide a successful example of innovation design that will change how R&D globalization is handled at Japanese companies and the very nature of R&D.