Technotalk

The Role of R&D Focusing on Open Innovation and Collaborative Creation
The True Innovation that Digitalization Enables

Alan Richardson   CEO, Cambridge Consultants

Norihiro Suzuki   Vice President and Executive Officer, CTO and General Manager of Research & Development Group, Hitachi, Ltd.

The Hitachi Group undertook a major transformation in its research and development style in 2015, moving its focus to customer-driven collaborative research where researchers work in collaboration with customers to gain insight into issues and create solutions. Today, with the wave of digitalization transforming the role of business and society in significant ways, solving the myriad of complex issues facing customers and society demands new ideas and innovations that diverge from the path followed to date. What, then, is needed to give rise to those ideas and innovations? We welcomed CEO Alan Richardson of Cambridge Consultants, a company that has supported a multitude of innovative endeavors as a leading technology consulting firm with a history in the UK and elsewhere, to talk with Norihiro Suzuki, who heads up Hitachi's 2,700-strong global Research & Development Group.

The Changing Style of Innovation

Suzuki: Today, we are facing a wave of digitalization. Every day, we are hearing about new developments in the Internet of Things (IoT), artificial intelligence (AI), and robotics. Hitachi is utilizing its knowledge and expertise in operational technology and information technology (IT), to apply such new technologies to resolving various challenges in society, such as aging infrastructure and diminishing workforces. Would you share your insights on this new digitalization wave, especially as it might relate to Europe?

Richardson: In Europe, digitization is advancing across every area of society and industry. In my home country of England, the government has focused on the digitization of public services and the widespread adoption of broadband, and there are also lively efforts to promote digitization in the private sector.

The backdrop to this is the same social issues that Japan faces, things like climate change, energy concerns, and an aging population. For example, in terms of measures to deal with an aging population, we need to expand medical treatment at home through support from IT and a range of other technologies. Companies need to innovate and to deliver new services based on that innovation. But this is not an easy problem, because in many cases, innovation doesn't fit along an extension line of the technologies a company has incorporated in the past.

Suzuki: Yes, Hitachi realized this and transformed its global research organization. We have the Global Center for Social Innovation (CSI) which conducts collaborative work with customers using the technology developed in the Center for Technology Innovation (CTI) to resolve customers' problems as well as challenges in society, and the Center for Exploratory Research to investigate solutions to future societal issues. Cambridge Consultants has a unique business model of producing "radical innovation" through product development with customers. We are now working with Cambridge Consultants to see how we might introduce the "radical innovation" process to change our business scheme and introduce new technologies. Would you please tell us more about "radical innovation."

Richardson: You can liken large Japanese companies to container ships: even though they have high internal efficiency, it takes them time to change course, and they tend not to excel at incorporating external innovation into their businesses. The polar opposite of this is the so-called Silicon Valley companies. They advance swiftly and flexibly like luxury yachts piloted by charismatic captains with high resources requiring high returns quickly, but sometimes they experience big failures. Perhaps you could say that British companies are somewhere in between the two. It's a fast yacht but the captain is a team player who takes input from the whole team to

optimize the outcome with more limited resources, and it produces innovation while using resources inside the team efficiently. In our collaboration with Hitachi, what we have been trying to develop together are the culture and processes to launch fast boats from your large ship so that you can maintain your efficiency whilst being able to take advantage of radical innovation.

In this way, you could say we are trying to produce a fusion of our ability to empower teams to develop radical innovation quickly in the British style with the best Japanese traditions of long-term follow-through in strategic areas.

So our process, instead of being based on the charismatic vision of one individual, employs a style of open innovation that brings about innovation

Alan Richardson

CEO, Cambridge Consultants

Alan was appointed Chief Executive Officer in July 2012 – after holding the post of Deputy Chief Executive since January 2007. Since his appointment he has led the company to more than double in size over the last four years and to extend its reach into Asia and the West Coast of the USA. Alan joined Cambridge Consultants in February 1984. Between then and 2002, when he was appointed Chief Technical Officer and earned a seat on the Board, he played a major role in building the company's business in electromagnetic sensors, becoming Division Manager of the Product Development Business. He restructured the group and grew it to become Cambridge Consultants' most profitable division. The unit had particular success in exploiting its intellectual property in integrated circuits, radar systems, and optical sensors. Alan graduated with a First Class degree in Mathematics from Churchill College, Cambridge in 1981. He completed an MBA with Distinction in 1998.

together with customers while incorporating outside intelligence. In the Cambridge district where University of Cambridge is located, a technology cluster of around 1,500 high-tech firms in the fields of electronics, engineering, biotechnology, and other areas has formed. A number of those companies are spin-out companies of Cambridge Consultants that have been built from foundation to billion dollar companies in five to 10 years, for example, CSR, Domino Printing Sciences and Xaar.

Japan produces a wealth of innovation in the fields of science and technology, and initiatives where companies create new value under long-term cooperative frameworks with one another seem to flourish. That kind of environment has a lot in common with the ecosystem that produces the British style of innovation. The culture of collaboratively creating radical innovation is something we would like to pursue in Japan as well.

Requirements for Producing Radical Innovation

Suzuki: Having had the opportunity to lead research organizations in both the USA and Japan, I have seen firsthand the Silicon Valley culture. The headquarters of the Services & Platforms Business Unit was established in Silicon Valley to leverage that culture of speed and agility in development. On the other hand, the very solid development of technology in Japan is also necessary. So I feel that a mixture of the Silicon Valley, Japanese, and European style is necessary depending on the region and the customer.

Cambridge Consultants has much experience in conducting radical innovation globally. For example, I believe the Iridium Project is one of your success stories.

Richardson: We've provided innovative design services to Iridium in the development of new satellite-based mobile phone products and its communications platform. One example of a social innovation was a system to provide surveillance of poaching of endangered animals that uses Iridium's satellite communications infrastructure. Our partner was the Zoological Society of London. Leveraging one of the benefits of Iridium, which is able to provide global coverage where other mobile phones cannot be used, we developed a covert ultra-low-operating-power system to monitor wildlife sanctuaries in Africa and alert rangers when there is a threat to endangered animals from poaching.

In a joint research effort with Energy Systems Catapult (a technology innovation center supported

by major international energy companies operating in the UK), we are developing a system that will lead to reduced energy consumption by allowing consumers themselves to manage their energy usage. As people use energy in different ways based on how they lead their lives, developing the system is not easy, but if we succeed, it will surely represent an innovation that creates a society engaged in reducing energy consumption.

We have also worked with Phillips on the development of new concepts for the "Lifeline" emergency alert system it acquired. We developed a service that uses various sensor technologies to automatically alert someone such as a family member when a person wearing the device collapses due to illness or otherwise. Down the road, system functionality will be further expanded to contribute to the development of a society where even elderly people living alone can lead their lives with peace of mind. These are some examples of the social innovation we have been focusing on.

Suzuki: What form should a framework for producing radical innovation take?

Richardson: Large ambition is what serves as the driving force behind innovation. Change entails risk, and it may take some time. To overcome those elements, it's important to maintain a high level of ambition. In addition to that, rather than just looking on the inside of your own company or industry, you need to shift your gaze outward and also accept different inputs.

When you compare a radical idea with an idea for continuous improvement, the radical idea is almost always incomplete. If in a classical idea generation process, the key stakeholders select ideas for further work, they will nearly always select ideas for continuous improvement rather than radical ideas because they are more likely to be complete and for stakeholders to believe they will work even if they have much lower potential than incomplete radical ideas. However, you shouldn't draw a conclusion on the merits of an idea straight away. You should only make a decision once you have thoroughly examined what the crucial issue essentially is and gained some degree of insight into the concept.

Also, even when a radical idea can't be applied to one field, it may show the potential to be utilized in another field. It's vital to take a broad view and seek out the fields in which an idea can be utilized.

Suzuki: I agree with the idea of large ambition serving as a driving force. I often strongly encourage researchers to have big ambitions and adopt broad outlooks.

Incorporating Diverse Viewpoints

Suzuki: Speaking of Hitachi's Social Innovation Business, we are currently engaged in various businesses that fuse the knowledge gained in business practice with IT, with a focus on four fields, namely energy, industry, urban, and finance/public/healthcare.

In the field of energy, we are involved with a number of demonstration projects related to microgrids in the USA and Europe. In Japan, we have jointly developed an area energy management system (AEMS) that centrally manages energy for an entire region in Kashiwa-no-ha Smart City, and through several collaborative creation projects such as this, we offer solutions that contribute to the stable supply and efficient utilization of energy.

▌ Norihiro Suzuki

Vice President and Executive Officer, CTO and General Manager of Research & Development Group, Hitachi, Ltd.

Norihiro Suzuki joined Hitachi after earning his master's degree from the Graduate School of Engineering, University of Tokyo in 1986, and began his career as a researcher in digital image signal processing and embedded software systems. After serving in several management positions where he lead research in IT, he assumed the post of Senior Vice President & CTO of Hitachi America, Ltd. in 2012. He returned to Japan in October 2014 to assume the position of General Manager of the Central Research Laboratory, and also General Manager of the Global Center for Social Innovation from April 2015. He was appointed to his current position as head of the Research & Development Group in April 2016. Mr. Suzuki is also a Vice President and Executive Officer, and CTO of Hitachi, Ltd.
Doctor of Engineering.
Member of the Institute of Image Information and Television Engineers, Institute of Electronics, Information and Communication Engineers (IEICE), and IEEE.

In the healthcare field, we have taken advantage of big data analysis technologies to develop technologies that are able to predict the risks of adult-onset disease and future medical expenses based on data from medical checkups and other sources. In conjunction with the Hitachi Health Insurance Society, we used actual data from 110,000 members to confirm its usefulness and provided this as a preventative service for adult-onset disease. This technology is also being utilized to improve healthcare services being promoted on a joint basis by the National Health Service, Greater Manchester in England.

We are also working on a joint basis with Bispebjerg and Frederiksberg University Hospital in Copenhagen, Denmark to improve the efficiency of hospital operation. Since this collaborative creation has yielded positive results, Hitachi and the City of Copenhagen also plan to jointly tackle the areas of remote healthcare and smart mobility. While Denmark is known for proactively pushing for social innovation, we hope to expand upon the collaborative creation achieved in these regions to provide solutions to social issues all over the world.

Richardson: Something that also happened with Iridium at one point is that, even with exceptional technology, if the way you propose that technology doesn't translate into the way the user thinks about interacting with it, it won't gain acceptance. To connect technology to a business, it's important to think of the entire concept from a service-oriented perspective. To do that, we need to take a close and careful look at what the essential issues customers face are, and what impact the technology will have on society.

By taking that approach with the Iridium concept, a solution based on the same original technology but with a completely different user experience is gaining wide adoption.

Suzuki: I agree. To that end, at the Global Center for Social Innovation, we have started collaborative creation by utilizing design techniques such as ethnography to grasp social changes and the issues faced by customers and share a vision. We aim to provide solutions that surpass the expectations of customers, and accomplishing that takes more than just engineering; we need knowledge of social science as well as effective research technique and design thinking.

Richardson: I think that is an important endeavor. In our solution development, we have placed an emphasis on incorporating a diverse range of viewpoints in a multidisciplinary team that considers human factors in addition to technology.

Suzuki: We have also begun similar initiatives in earnest. We started by establishing an embedded laboratory in the University of Tokyo and then expanded to other universities and research institutions in Japan and abroad, including Kyoto University and Hokkaido University. We are striving to form a new ecosystem that will serve as the foundations for open innovation.

Richardson: That's an interesting plan. In the Cambridge district, relationships between universities and the industrial world were once a rarity, but ties between the various departments of University of Cambridge and industry have also strengthened in step with the growth of the technology cluster. Since people, technology, and knowledge came together and several venture companies were formed and achieved success out of that mix, networks have expanded and independent clusters attracting even more people and companies have formed. Harnessing the array of scientific knowledge developed by University of

Cambridge as a driving force, open innovation has been achieved and an environment in which many companies can learn together has been formed. This has led to the strong growth of the Cambridge area and the British style of innovation.

To Become an Innovation Partner for the IoT Era

Suzuki: Earlier I spoke briefly about the key fields Hitachi is pursuing. The common infrastructure supporting those fields is an IoT platform named "Lumada." It serves as the platform to deliver new value to customers by collecting a wide range of data from the front lines of business, analyzing that data with AI and various tools, feeding back the results of that analysis into the control systems powering the front lines, and boosting productivity.

In May 2016, Hitachi announced its Mid-term Management Plan covering the period from FY2016 to FY2018. The major objective is to become an innovation partner for the IoT era with a focus on Social Innovation. While the mission of R&D with respect to this objective is quite simply to create innovation through IoT, what do you think the success factors are to achieving this?

Richardson: IoT is a very unique topic, but it shares some qualities with the IT trends we've spoken about up to now. In the field of IT, the introduction of new radio standards is a frequent occurrence, one example was Bluetooth*. When it was first put forward, the standard itself and the company developing chip-based products implementing the standard were viewed with skepticism. But the technology steadily established itself and today it has

become a multibillion-dollar market; partly because of regulation on hands-free mobile usage and partly because it became possible to dispense with separate application processors for many applications. That's because if you only look at the technology, it is complex and difficult to grasp, but by visualizing it in terms of solutions that help resolve customer issues or solutions that enhance the value of end-user experiences, it became possible to provide customers with real benefits.

I think you can say the same about the IoT. The growth of the market will probably take longer than expected. However, if you understand it at the essential level, provide the technology as solutions that deliver value to customers and end users, learn from and solve the challenges that arise from those efforts, and continue to iterate on that process, you should be a winner. Since Hitachi has sufficient technological resources as well as a corporate culture of cultivating future eras with technology, I think it has a lot of potential.

Suzuki: Thank you. We have already started several collaborative creation projects with customers concerning the IoT. One of them is smart manufacturing. This is a solution to optimize an entire factory by placing various sensors around the production site, and engaging in the collection and utilization of data not only from manufacturing equipment but from the actions of people as well. At present, the system is for use in single factories, but for the next phase we plan to connect multiple factories and optimize them as a whole.

We are pursuing similar initiatives in the areas of warehouse management and distribution. By starting from a single company and in time connecting related players and value chains, we are aiming to achieve optimization across entire industries, regions, and

societies. We are also pressing ahead with self-driving cars, the alleviation of traffic congestion, and streamlined railway maintenance as fields conducive to IoT utilization.

Richardson: The fact that things that have become issues on the front lines of actual business are being solved through IoT is crucial, because you can't develop perfect systems by just thinking them up in the lab.

Sharing Purpose and Value

Suzuki: At Hitachi we have also begun to use AI for actual business. When we load a vast array of business-related data and information on human behavior into Hitachi AI Technology/H, which we developed, and then design an outcome we wish to improve, the technology discovers correlations between the data and generates hypotheses about how to improve the outcome. An important characteristic of the system is that it is general purpose, not specific to a certain area of application. The system has already built up a track record improving work efficiency in distribution warehouses and boosting white-collar productivity, and these achievements represent important usage cases for Lumada. In this way, utilizing new technologies such as AI and the IoT to strengthen service businesses and achieve social innovation is one of our major targets. To that end, what kind of values do you think R&D or a company as a whole should embrace?

Richardson: Companies are formed by their purpose and value. To achieve that by having a purpose and creating value, it's important for leaders to clearly demonstrate those things. At Cambridge Consultants, several years ago we rapidly increased the number of employees from around 300 to 700. That was a huge amount of growth, but it also introduced risk, because we had to share company values that until then had been implicitly understood and shared among a small number of people with these new human resources. That's why the need to clearly demonstrate those things arose.

At the time, we reaffirmed that the concepts of integrity and care were important as our values. Since radical innovation doesn't always succeed, even when it fails, we have to make sure that the people involved aren't so bruised that they hesitate to take on the next challenge. In addition, when problems emerge in society due to new technologies or services, it's vital that we work together with customers and demonstrate integrity as we seek solutions. We've achieved innovation based on these values.

Suzuki: Hitachi has embraced the values of "Harmony," "Sincerity," and "Pioneering Spirit" as its founding spirit. I think that echoes the values of Cambridge Consultants.

Richardson: We understand why we have been successful in building constructive relationships. It's because we have shared our fundamental values. Moving forward, we want to continue to achieve innovation under that same set of values.

Suzuki: Similarly, we are striving to once again share our founding spirit internally and achieve ambitious goals. Thank you for being with us today.