

Summary Translation of Question & Answer Session at FY 2016 R&D Strategy Briefing

Date and time: October 20, 2016, 13:30-14:30

Venue: Okada Memorial Hall, Fujitsu Laboratories Ltd.

Presenter: Shigeru Sasaki, CEO, Fujitsu Laboratories Ltd.

Questioner A

***Q1:** I would like to ask about AI. The level of Fujitsu's AI technology—and, for that matter, Japan's—is considered to be behind that of the US, but what is your understanding? If so, what do you need to do to catch up? Where are Fujitsu's strengths?*

A1: As for whether we are behind the US, we have to admit to being slightly behind, including in the way we promote our efforts. Still, while it is said that advancements in deep learning have significantly raised recognition performance, enabling practical implementation, this really just refers to neural networks, an approach in which images are converted into data for machine learning of patterns for recognition. The concept of the semantic web has been around since the late 1990s. As I mentioned earlier, in 1999 Fujitsu put forth its vision of "Everything on the Internet," and, after that, everything became connected. Still, however, there has not been a way to generate insights from the world's graph-structured data. To catch up in AI, our strategy is to devise ways of expressing the enormous knowledge that exists in the world as graph-structured data, devise ways of learning from it, and combine it with a variety of new data so as to generate new insights. For more details, please be sure to see the announcement later today on this from Seishi Okamoto, (Director of the Artificial Intelligence Research Center).

Questioner B

***Q1:** Please tell me how many employees you have at your locations in Kawasaki and Atsugi, and how many of them have Ph.D. degrees.*

A1: Regarding the number of researchers at our Kawasaki and Atsugi Laboratories, we have roughly 1,200 nationwide. About 800 people are in Kawasaki, and the rest are at Atsugi. We do not disclose the number of employees with Ph.D. degrees.

***Q2:** As Fujitsu overall is exiting the field of semiconductors and changing its business portfolio, what will happen to the semiconductor research being conducted by Fujitsu Laboratories?*

A2: Our Atsugi Laboratory has been involved in basic research and R&D in semiconductors and materials. Semiconductors can be broadly divided into silicon semiconductors and compound semiconductors. With gallium nitride and other compound semiconductors, our Atsugi Laboratory has technology for producing new transistors. It is not as if we changed our skills. While shifting into new fields, our research projects are focused on advanced technologies. We cannot have everything become a black box to us, so Fujitsu Laboratories is devoting resources to semiconductor design technology and is positioning itself to be able to contribute to the business units (in servers and Ubiquitous Solutions). Within this situation, we are leveraging the skills of the team developing semiconductor algorithms by shifting them into a different field.

Q3: *I have a question about your R0 stage of research—Leading-Edge Basic Research. Please describe your research approach in this area and whether you collaborate with Fujitsu Research Institute.*

A3: We collaborate with Fujitsu Research Institute in the areas of marketing and at the stage of Prototype of Concept, but not from the R0 stage. The reason is because R0 is positioned as an area in which each researcher uses their skills to take on new challenges. When it reaches the stage where we might be able to convert it into a technology development project, we will bring in Fujitsu Research Institute to get their views on trends and other insights.

Q4: *I think Socionext has some people involved in semiconductor architecture. Are any of your researchers being transferred to that company?*

A4: A few, but we will continue our technology collaboration.

Q5: *Are some researchers at your Atsugi laboratory still doing basic research on carbon nanotubes and other materials?*

A5: Yes.

Q6: *With regard to leading-edge basic research in the social sciences, are you doing this independently of Fujitsu Research Institute?*

A6: Most of the employees of both Fujitsu and Fujitsu Laboratories are engineers, so to do this type of research we need to collaborate with economists, sociologists, and psychologists. We therefore position it as open innovation with universities and other organizations.

Q7: *In the flow from R&D to commercialization, I get the impression that most of it follows a linear progression, but am I correct in understanding that R0 stage research involves feasibility studies of seed ideas?*

A7: Yes, your understanding is correct.

Questioner C

Q1: *For such leading edge technologies as AI and graph-structured data analysis, how do you deliver them? For technologies that have created an impact, I think delivery methods can take the form of open source technologies, APIs, or such as with AWS (Amazon Web Service) that anyone can use on their own. Will Fujitsu deliver them to customers who have placed system integration orders, or do you have a different business model in mind?*

A1: For AI, we have already introduced Zinrai through press releases. Zinrai is positioned as an AI platform. Technologies developed by Fujitsu Laboratories are incorporated into Zinrai as software stack or elemental technologies, and our approach is to deliver services using the Zinrai platform.

Q2: *Is Zinrai provided just to customers who order it, or more broadly?*

A2: It is part of Fujitsu's business, so it will be both.

Questioner D

***Q1:** In your discussion of computer architecture, the topic of domain-oriented computing arose. In that area, today I think you have an announcement in the field of quantum computing. Aside from that, in various materials other technologies, such as neural networks and accelerators, are mentioned, but are all of these areas that you are researching? Or is what you are announcing today an area of particular focus? Also, what are your thoughts about commercialization?*

A1: In all of the areas mentioned we are engaged in research. For today's announcement, we selected a topic that we thought would surprise people. As for commercialization, in conjunction with the business units, we will make an announcement on a separate occasion.

Questioner E

***Q1:** I would like to ask about R&D expenses. You mentioned that expenses for this fiscal year would be about 30 billion yen. What were they last year, and what is the rough allocation among your different projects, and, in comparison with last year, on what areas are you placing greater emphasis?*

A1: It is just as stated in our materials for the budget size and the research areas. We are planning total research expenses of about 30 billion yen, which is the same as the previous fiscal year. As for the content, within the hyper-connected cloud, we are placing special emphasis on AI and computer system architecture. In a major resource shift from this April, we are focusing on a research center for AI and security, and that will entail changes in our organization and a slight shift in our budget.