Computer History Museum

Oral History of Shigeru Fujii

Interviewed by:
Anant Agrawal
Douglas Fairbairn

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Doug Fairbairn: We're here at the computer history museum at Mountain View California. We have with us Fujii-san who is a long-term, longtime employee of Fujitsu and he will be describing his background and his career and contributions to the industry. Joining me in the questioning, interviewing of Fujii-san is Anant Agrawal who is also a major contributor to Sun and to SPARC and to the semiconductor industry and we're delighted to have you all join us here today. So thank you very much for joining us. Thank you. Fujii-san.

Shigeru Fujii: Hai.

Doug Fairbairn: We would like to start by hearing a little bit about your family background; where you were born; did you have any brothers and sisters and what was your family life like growing up in Japan. So let's just start, what year were born and where in Japan?

Shigeru Fujii: Yes, I was born in Osaka, Japan.

Doug Fairbairn: Osaka?

Shigeru Fujii: Yes, around 60 years ago I was born in Japan with my sister. My father was, in Japanese it's some guy working for company; we call this guy salary man.

Doug Fairbairn: Company man or?

Shigeru Fujii: Yes, company man, yes. But my father was working for some company because salary, company man works around afternoon to evening. But morning section, he did his job as making TV and repair the TV or radio; that's the kind of job he did; that's the meaning of that. In my home and in his room there was lots of electrical equipment.

Doug Fairbairn: So you had a lot of electrical equipment around your home?

Shigeru Fujii: Yes, oscilloscopes plus some kind of checkers because in my youth I used that one and my father mentioned, "Don't touch my equipment."

Doug Fairbairn: Did he encourage you to learn about what he was doing?

Shigeru Fujii: Yes, he encouraged me, yes.

Doug Fairbairn: So, did he ask you for help from time to time?

Shigeru Fujii: Yes, when I joined the high school I helped him to make some antenna or bring some TV set to customer and some tuning. I helped him.

Doug Fairbairn: And he was designing television sets and building television sets?

Shigeru Fujii: Mainly building television sets.

Doug Fairbairn: Building television sets?

Shigeru Fujii: Yes, but a few years later there's no job to building the TV in our house. Big maker made everything by themselves.

Doug Fairbairn: But he had another job that he went to?

Shigeru Fujii: Yes, still was there doing some kind of repairing or making antenna on some kind of construction electrical route line construction in each house; that's his job.

Doug Fairbairn: He did not teach you what he knew about building television sets?

Shigeru Fujii: No.

Doug Fairbairn: No?

Shigeru Fujii: But he bought at bookstore a lot of magazines on electronics; I can read that one by myself; it was just very interesting. Most of them were about tubes

Doug Fairbairn: Right; all about tubes.

Shigeru Fujii: Yes.

Doug Fairbairn: And so, were there any other people while you were growing up, before you went to university, who influenced you to pursue a career in engineering?

Shigeru Fujii: My guess is no; only my father.

Doug Fairbairn: And in school you studied basic science. Did you study electronics at all before you went to the university?

Shigeru Fujii: No.

Doug Fairbairn: So, you have a sister?

Shigeru Fujii: Yes.

Doug Fairbairn: And she's older or younger?

Shigeru Fujii: Younger sister.

Doug Fairbairn: Younger sister?

Shigeru Fujii: Yes.

Doug Fairbairn: And did she have any interest in science.

Shigeru Fujii: Nothing. She and her husband are teachers of high school. Yes, now they are retiring a little bit.

Doug Fairbairn: What about your mother; did she encourage you to learn about science or electronics?

Shigeru Fujii: No. Good mother.

Doug Fairbairn: Then you decided to go to university?

Shigeru Fujii: Yes.

Doug Fairbairn: What university and how did you choose that university?

Shigeru Fujii: Oh that's a good question. I liked to study mathematics but after—around mathematics, mathematics meaning that only some kind—I have to explain that it's no business becoming professor something; that is not so good for me. The mathematic—how to run the mathematics but how to make a business. Electronics was much better than mathematics; that's my opinion. So when I joined, it's fourth generation in the college/university we can select that some kind of professor. At that time I select the mathematics professor, yes.

Doug Fairbairn: You said fourth generation; you mean in your fourth year or…?

Shigeru Fujii: Fourth year, yes, yes.

Doug Fairbairn: Fourth year you can choose. So before that were you studying just general education?

Shigeru Fujii: General one, yes.

Doug Fairbairn: So you then started studying mathematics?

Shigeru Fujii: Yes. And so, I studied mathematics for three years; physics and mathematics.

Doug Fairbairn: Did you study electronics in the university or only after you graduated?

Shigeru Fujii: Oh it's a general study that's including electronics, electronic everything, but the focusing to other fourth year and other two master degrees I studied mathematics and the physics, yes.

Doug Fairbairn: And so when you finished you finished a master's degree?

Shigeru Fujii: Yes.

Doug Fairbairn: And you then went out to work?

Shigeru Fujii: Yes, I just joined after education; that's 1976.

Doug Fairbairn: And when you studied electronics did you study solid state devices, transistors, integrate circuits?

Shigeru Fujii: I didn't know the detail of transistor before I joined the Fujitsu Laboratories.

Doug Fairbairn: So your first job you joined Fujitsu Laboratories…

Shigeru Fujii: Hai.

Doug Fairbairn: …out of university?

Shigeru Fujii: Hai, in the department of semiconductor R&D in semiconductor?

Doug Fairbairn: But they must have liked your background in physics and mathematics.

Shigeru Fujii: Yes, that's the beginning of how to understand the semiconductor transistor through the <inaudible> equipment and the temperature—no, no, no, temperature equipment something, the <inaudible> mathematics was applied to how to run the semiconductor; that's my history. So that's my job with the two-dimensional analysis of very short channel transistor; that's my first job in laboratory.

Doug Fairbairn: And this was in 1976?

Shigeru Fujii: Yes, '76/'77, yes.

Doug Fairbairn: Was there somebody at the laboratory who kind of took you and helped train you? Did you have to learn on your own? How much guidance did you get?

Shigeru Fujii: Oh in that semiconductor laboratory there were a lot of specialists of semiconductor; I could get anything from them, good teacher, though at that time Fujitsu business was focused on supporting ECL. But the laboratory focused on CMOS. And so, then Fujitsu announced, and just started to develop a chip that's IBM compatible mainframe machine for not only by Fujitsu but also Amdahl. While the business unit focused on "this year" devices but the laboratory was looking at what's the next issue should we focus? CMOS.

Doug Fairbairn: And what particular problem or what did you investigate? What did you study in that first job? What was the problem you were trying to address?

Shigeru Fujii: Oh I mentioned the two-dimensional analysis and next my target was DSP; detailing our process or establishing our processor for telecom; so that's a good job for me. That's a joint development

with telecom team and my semiconductor team and laboratories. And we made good DSPs; fastest DSPs in the world.

Doug Fairbairn: And this was in the late '70s?

Shigeru Fujii: No, we announced it at the 1982 ISSCC

Doug Fairbairn: 1982; okay.

Shigeru Fujii: Yes. So at that time I studied what is the semiconductor? What's a device? And one more item. In laboratory, at that time management of laboratory asked us to make a semiconductor in our lab so I did alignment, etch. So that I'm the final last stage to do everything for semiconductor; designing, processing, packaging and the variation; I did everything. That was a good experience for me in the laboratory world.

Doug Fairbairn: Before you did the DSP did you have background in DSP or did you design work or did you work with another team who were doing the design?

Shigeru Fujii: Yes, together with my telecom team. Telecom team had good architecture but how to implement this architecture to silicon; that was my work, yes. My weak point was still software.

Doug Fairbairn: So, were there other interesting or important things? The DSP work you did you were still within Fujitsu Laboratories, correct?

Shigeru Fujii: Yes. After I designed DSP, I joined the business unit because when I designed DSP, I noticed a number of issues related to the design. I noticed that the first that the process technology, at that time we select at 2.3 microns, but processing was not so good. The next challenge was the EDA [Electronic Design Automation] technology; CAD tools were not so good. They did not cover the future products, so that's how to implement, how to improve this kind of process, the design technology including libraries so that's why I joined the business unit and I directly managed these kinds of developments. So, next job with gate array, you know.

Doug Fairbairn: When did you move to the business unit, what year?

Shigeru Fujii: After ISSCC announcement, that was in 1982.

Doug Fairbairn: 1982 about.

Shigeru Fujii: Yes.

Doug Fairbairn: And so your next step was to get into gate arrays?

Shigeru Fujii: Yes, I liked to focus on standards cells, but then management mentioned, "please take care of new type of gate array for our computer groups.

Doug Fairbairn: For your computer groups?

Shigeru Fujii: Yes, so that's when we designed the C 20,000 gate array.

Doug Fairbairn: And that was the one that ended up being used by Sun.

Shigeru Fujii: Yes. First customer was our computer group; that was the first design using CMOS entirely. And those not only designed the first time, but I visited those big customers in Boston and Dallas, I cannot remember that company name it was including Data General and…

Doug Fairbairn: Prime Computer?

Shigeru Fujii: Yes, Prime Computer and a lot of people.

Doug Fairbairn: Wang?

Shigeru Fujii: Supercomputer.

Doug Fairbairn: Oh thinking machines or…

Shigeru Fujii: Thinking machines didn't use my chip.

Doug Fairbairn: So Anant, maybe you can pick up this story we're into gate arrays and I'd like to learn about the technology that you had for those gate arrays and so forth. So go ahead.

Anant Agrawal: So Fujii-san, you said you moved in 1982 to the business unit.

Shigeru Fujii: Hai.

Anant Agrawal: And even though you were interested in standard cells, you were asked to work on a gate array called C20k.

Shigeru Fujii: Hai, hai.

Anant Agrawal: Now, looking back, that was a very successful product for Fujitsu.

Shigeru Fujii: I think so.

Anant Agrawal: Yes. Now, when Sun came to you first time, Sun had custom requirement; how was that handled? Whose decision was it? And did that affect the program for the computer group? So, when Sun came to you…

Shigeru Fujii: Hai.

Anant Agrawal: …Sun said they wanted a register file. Take gates out of one area put a register file. How was that decision made? Who made that decision?

Shigeru Fujii: At that time the top guy of Fujitsu Semiconductor, Mr. Yasuku, Yasuku-san decided. And those other Fujitsu top people, Mr. Yamamoto, everybody agreed. My guess is when Sun came to Fujitsu, that time Sun contacted computer groups and semiconductor groups but the computer group had not so good, how to explain, hm, how to say, semiconductor group has a lot of interests but the computer group has not so many. Yasuku mentioned this to head of Sun - he attended a meeting under my boss; that first time.

Anant Agrawal: Now, clearly it was a very successful program for Sun.

Shigeru Fujii: Hai.

Anant Agrawal: You were actually a designer at that time, is that correct?

Shigeru Fujii: Hai.

Anant Agrawal: You designed the most difficult part of the C20k Sun chip?

Shigeru Fujii: Hai. Hai.

Anant Agrawal: At that time, there were not good enough tools so tell us about some of the challenges you had, engineering challenges.

Shigeru Fujii: Yeah, yeah, yeah but the C20,000 gate array consisted of three general areas; only logic, including one fourth memory, one second memory, three type we have but Sun-san requests best on SPARC architecture. There was a very high-speed register file but another Sun request was a 3-port memory type register file; that was very difficult for us. We only had a single port register file. It was a big challenge on how to achieve this or how to make a new register file for Sun,. But our memory consisted of 24-bit because our memory was more suitable for IBM architecture; 16- plus - bit and more totally 24-bit; we had ECC on the byte. And we were discussing this one for a long time including midnight at restaurants, early morning and I notice that Sun requested only 18-bit ranks. So, <inaudible> they under <ph?> 60-bit memories; how to use this one? We designed new decoder, a sensor using a memory cell and we achieved that 3-port memory for Sun Microsystems.

Doug Fairbairn: So, did you do that design work?

Shigeru Fujii: Yes by myself.

 Doug Fairbairn: And were you working in Japan or working here?

Shigeru Fujii: At that time, in Japan. But sometimes I visited San Jose or Santa Clara, their Sun office.

Anant Agrawal: So Fujii-san, I was at Sun at that time and if you had not done what you were able to do so quickly and so beautifully Sun could not have used the C20k. So your innovation enabled Sun to get to market.

Shigeru Fujii: Yes, thank you very much, yes.

Anant Agrawal: How do you feel about that personally?

Shigeru Fujii: Huh?

Anant Agrawal: How do you feel about that personally?

Shigeru Fujii: Yes, that's a very good job for you and me and also the team. I am very excited after I noticed that "Oh if we do this kind of work we can meet Sun's request," such with my team, including me, who were very happy.

Anant Agrawal: So, after C20k, what is the next thing you did?

Shigeru Fujii: C20k was a very good generic part using 3-layer metal and the technology was at 1.5 micron. And also the most, or a lot of US computer makers, wanted to use us. Then two or three years later I transferred this project to other people. I began to do standard cells for a change, not to go to a sea of gate. Yes, next gate array series was based on sea-of-gates, including logic and memory using the same cell – that's a new architecture step by step.

Anant Agrawal: So by the time were you now managing the project or were you still doing circuit design?

Shigeru Fujii: No, becoming higher; that's not so good for me. Still I liked to do design; design technologies that I was interested but nobody could control me. I had to control me by being myself. That meant obtaining a higher position.

Anant Agrawal: So how many people did you have working on that project?

Shigeru Fujii: C20?

Anant Agrawal: No, on the standard cells.

Shigeru Fujii: Oh the standard cells were at very early stage at about two or three people report with me. Then totally, finally it's we are joined the VSIA [Virtual Socket Interface Alliance], at that time 200 people reported to me, many design supporting engineers, technology development engineers.

Anant Agrawal: So, this is the first time you really managed people, especially a large group.

Shigeru Fujii: Yes.

Anant Agrawal: So, I have two questions. One is how difficult was it for you to transition from circuit design to managing a group of people?

Shigeru Fujii: it was step by step.

Anant Agrawal: Step by step?

Shigeru Fujii: Yes, educated, educated, educated. In this timeframe something was up, not so good. Somebody mentioned I just don't want to push him to the limit. He said bye-bye Fujii-san. That kind of bad scenario we had; and also that me and my team becoming better and better.

Anant Agrawal: So what is the product that your team produced? You said a standard cell array?

Shigeru Fujii: Yes.

Anant Agrawal: And was that commercialized? Sold to customers?

Shigeru Fujii: Yes, there were two businesses for me. One was the ASSP business. I managed the complete ASIC business; only provide the libraries, EDA tool set, and design flow to the customer. And after we received the RTL and the transfer that's achieved; that's mainly why ASIC business did well. Otherwise ASSP. In the early stage I focused on DSP; DSP like Venus based on our confidential. So that's floating-point DSP and audio type DSP, my chief design also with DSP but actually, frankly speaking, I could not catch up with TI. I could catch up NEC, but TI invested a lot of money and resource to support their own DSP. We need to—didn't invest enough, but we have good architecture, good customer but market is very big. Our share is very small.

Anant Agrawal: What kind of applications were the…

Shigeru Fujii: First one telecom.

Anant Agrawal: Telecom.

Shigeru Fujii: Modem. But next one is audio. Third one is graphic.

Anant Agrawal: I see.

Shigeru Fujii: Graphic was very interesting for my job. At that time our computer group didn't agree to use its own graphic processor but in the market, for example, Game Machine, their design based on DSP architecture it's dominant, lots of processers; that's one.

Anant Agrawal: So, let me fast forward a little bit. There was a time when you were managing the Fujitsu and Microelectronics America.

Shigeru Fujii: Yes.

Anant Agrawal: How long did you manage that?

Shigeru Fujii: Less than two years. That was actually 1.5 years.

Anant Agrawal: 1.5 years.

Shigeru Fujii: Yes, including …..

Anant Agrawal: So, how was it different managing people in the US versus managing people in Japan?

Shigeru Fujii: That's an excellent question. It's very difficult for me to say in English, but the biggest difference between Japan and the US, in Japan most, maybe lots, of engineers can't understand what the boss wants them to do. But in US, the boss should say what's your job. That's what I think. Obviously, that's kind of one. In the US management should define their job and the variations, but in Japan they're not so clear.

Anant Agrawal: There is no clear direction?

Shigeru Fujii: Yes, but engineer should be able to understand what top people—management want

Anant Agrawal: What they are thinking?

Shigeru Fujii: Yes, thinking; that makes sense. And the other one is that how to evaluate their member's [employee's] job. In Japan it's not so clear.

Anant Agrawal: I see.

Shigeru Fujii: So, after I became higher and higher I'd like to clarify these kinds of human resource issues like the US. US is much better than Japan. The younger generation has already changed to US style.

Anant Agrawal: Would you say that your experience in the US was very valuable for you personally?

Shigeru Fujii: Yes, it was very valuable.

Anant Agrawal: And you said you were able to apply some of the management techniques learned in the US and applied back to Japan.

Shigeru Fujii: Yes, I did apply that's why.

Anant Agrawal: So, when you went back to Japan what was your role in Fujitsu?

Shigeru Fujii: Oh after I returned to Japan, I became the number two or number three of all of logic.

Anant Agrawal: How many people did you have…?

Shigeru Fujii: In that time, it didn't involve the fab; that's about totally 1,000.

Anant Agrawal: So would you say your group was the largest customer of the fab resources?

Shigeru Fujii: Yes.

Anant Agrawal: Were you ever in a situation where you wanted certain process modifications for performance purposes and the process roadmap did not have those specific changes; how did you deal with that in Japan? Were you able to go to the fab and have them change the process?

Shigeru Fujii: So, okay, our biggest customer was the captive computer group. So the computer group targeted the workstation or super computer or the processor market. If this final market changes – in case the workstation should be changed, processor should be faster; that kind of change was happening once a year or twice a year, that meant that our target market asked us to move the target. But in the silicon side it's, how to explain, it is easier for us to change transistor power, not the wiring technology; that meaning we are very flexible to change transistor performance itself. Does that answer for you?

Anant Agrawal: I see. Yes. So you will when a new processor was released you may have transistor A, B, C.

Shigeru Fujii: You are right. That's easier for us. Our mind, how to support the customer, how to improve the customer benefit so that it is easier for us to change the transistor improvement.

Anant Agrawal: So, clearly doing processor or workstation chip set was very profitable because it then turned into a workstation sale for Fujitsu. So the chip that goes in the workstation enables or enabled at that time Fujitsu to sell the big workstation which may be $10,000.

Shigeru Fujii: Hm.

Anant Agrawal: However your products were sold as individual chips; is that correct, the DSP product?

Shigeru Fujii: Pardon?

Anant Agrawal: The products that your group designed…

Shigeru Fujii: Hai.

Anant Agrawal: …they were sold to customers other than Fujitsu also?

Shigeru Fujii: Uh-huh.

Anant Agrawal: So did your group ever run into a fab capacity issue because processor group maybe got higher priority in the fab, the workstation group gets higher priority in the fab?

Shigeru Fujii: Frankly speaking it's captive customer, including processor group, show us that's a very good volume with a secret plan. It is easier for us to get approval from headquarter if captive customer show us a good volume we can invest enough to support our internal customer. But actually they could not sell that number. That mean we made this one based on captive requirement, [raises hand high] but actually this enough for captive customer [lowers hand to show actual volume]. Anytime this would happen, so that we should sell another one, we have enough capacity for customer in the world, worldwide customer in any time.

Anant Agrawal: So Fujii-san, I look at your progress within Fujitsu, the initial days were very good. Soon you were managing a thousand people resource. What was your next step in Fujitsu?

Shigeru Fujii: Oh I became the COO of total Fujitsu Semiconductors.

Anant Agrawal: Oh that's a very big job.

Shigeru Fujii: Yes, including memory but at that time we sold out Non-Volatile memory products spansion and also I decided to stop DRAM manufacturing; now it's the only logic group under my group, that's the total semiconductor group.

Anant Agrawal: So that must have been 20,000 people?

Shigeru Fujii: No, less than 20,000; 12,000 people including fab.

Anant Agrawal: 12,000 people. I see.

Shigeru Fujii: Another big headache. How to fill the fabs?

Doug Fairbairn: What were the major logic products? What were the leading logic products in your organization?

Shigeru Fujii: My team?

Doug Fairbairn: Yes.

Shigeru Fujii: Some kind of special customer product for still cameras.

Doug Fairbairn: The still camera.

Shigeru Fujii: This engine is very good for us. Customer strongly ask me don't say customer name. Most of the details still camera vendor used by our customers.

Anant Agrawal: So, what year were you promoted to that job where you got the fabs as well?

Shigeru Fujii: Huh?

Anant Agrawal: What year you got the fab under you?

Shigeru Fujii: After I returned to Japan then next year because—2005 or something; in that time I'm some kind higher level.

Anant Agrawal: At that time the industry was going through a lot of uncertainty and the fab capacities were or excess fab capacity was a big problem because it would make the products more expensive if the percentage utilization of the fab is low.

Shigeru Fujii: Yes, so that's—in that time Fujitsu, we focus to develop 90 nanometer technologies. As a result that's the number one technology to work. Much better than TSMC, much lower power than TSMC, we achieved that one.

Doug Fairbairn: At 90 nanometer?

Shigeru Fujii: Ninety nanometer; we understand that one. So in that time we started to do not only ASIC but also COT of foundry services.

Doug Fairbairn: To try to fill the fab.

Shigeru Fujii: Yes.

Doug Fairbairn: Yes.

Shigeru Fujii: So we made 300-millimeter fabs in Mie. [?]

Anant Agrawal: So Fujii-san, the work you did in 2007 and 2008, very difficult to do in Japan…

Shigeru Fujii: Hai.

Anant Agrawal: …which is restructuring the company.

Shigeru Fujii: Hai.

Anant Agrawal: If I recall the company was supposed to lose hundreds of millions of dollars and you came up with a plan and implemented the plan that saved the company about $700 million.

Shigeru Fujii: Uh-huh.

Anant Agrawal: Something around that, maybe it's not the right number, but that the decisions you made, really made Fujitsu a solid semiconductor supplier and I believe it is the strongest in Japan today. That was a very major accomplishment.

Shigeru Fujii: Uh-huh.

Anant Agrawal: Number one, do you believe Fujitsu, can it survive as semiconductor company? And number two, what are the growth areas that Fujitsu should focus on?

Shigeru Fujii: Very detailed questions. The answer for first question that's I could not answer.

Anant Agrawal: Okay.

Shigeru Fujii: Next question. The biggest reason Japanese semiconductor industry is becoming worse and worse - that's merely we focused to support domestic customers. What happened to domestic customer? For example TV, Panasonic, Sony; not an Apple, not a Google, not an Amazon. So this mean then totally Japan industry becoming lower. As a result customer business is becoming worse; that's our semiconductor business becoming worse; that's the biggest risk. So, that's it, how to overcome this one that's Japan industry should be more global company, mainly semiconductor. That's the only solution for semiconductor industry in Japan - should become global. But what mean global? Not only progress <ph?> but also fab and the human resource issues, employment issues; a lot of issues…

Anant Agrawal: Culture.

Shigeru Fujii: …culture should be more global; that's my sense. So I sense a lot people, US and the UK, younger generation in my organization that the current general manager is mainly of general manager is good experience in the overseas.

Anant Agrawal: Who's not experienced?

Shigeru Fujii: Good experience in the overseas.

Anant Agrawal: Oh I see.

Shigeru Fujii: But they didn't use this experience in Japan.

Doug Fairbairn: So you feel that your experience in the United States was very helpful to you in…

Shigeru Fujii: Yes, for me, but my members.

Doug Fairbairn: Not so….

Shigeru Fujii: That's my sense.

Doug Fairbairn: So how much time did you spend in the United States?

Shigeru Fujii: 1.5 years.

Doug Fairbairn: That's all? I thought maybe you had two different assignments in the US but…

Anant Agrawal: No, just one.

Shigeru Fujii: Yes.

Doug Fairbairn: Okay.

Anant Agrawal: So Fujii-san, you were known within Fujitsu Semiconductor to make quick decisions. So, if you saw something wrong you would make quick decisions.

Shigeru Fujii: Hai.

Anant Agrawal: This is very different than the traditional Japanese way of making decisions which is more consensus-driven.

Shigeru Fujii: Hai.

Anant Agrawal: How did you find that culturally accepted in the organization? Did people accept that style of management?

Shigeru Fujii: So, previously I say that culture, there's a big difference between the US culture and Japan culture. One is that you mentioned that, consensus; spending time to get a consensus; that's meaning.... In Japan nobody defined the clear responsibility, who has what responsibility; this not so clear. But my guess, I had—this is my responsibility. If I say this one, nobody had a plan. "Oh, okay you do." That kind of culture they have. This means that a very good leader can control this company. Today, they are not so good leader. Several small leaders fighting; that's not so good. The top people should be defined that you are responsibility here and make a profit, make our future something; this is the most important one. In the US they see this responsibility very clear.

Anant Agrawal: Clearer direction. So Fujii-san, I understand that you are currently in Fujitsu Labs, which is where you started your career. Now in addition to that, you are also associated with another organization as an advisor. Could you tell us a little about that?

Shigeru Fujii: Oh thank you very much. So, August 1st, we made the new small companies; mainly Fujitsu invest, DOCOMO invest, Panasonic invest. There's a target to develop, sell the platform of modem; we focus everything modem. We are spending a lot of time with DOCOMO to define the new type modem from 3G and LTE other ones but we'd like to sell this new type LTE platform not only DOCOMO but also worldwide.

Doug Fairbairn: This is for wireless communication?

Shigeru Fujii: Wireless, yes. So, we, DOCOMO and Fujitsu, agreed to make a new company but still very small. We'd like to expand our business to the worldwide; that's a new business for Fujitsu. That's some kind of progress; the best of our own telecom people come to the company, not semiconductor people. Progress made by telecom group.

Anant Agrawal: So this is for handsets?

Shigeru Fujii: Handset.

Anant Agrawal: Okay, Fujii-san, well thank you very much. And Doug, you want to wrap up?

Doug Fairbairn: Sure. Thank you very much for taking the time to spend with us.

Shigeru Fujii: Thank you very much, yes.

Doug Fairbairn: It's been very interesting to hear more about your background and it'll be very valuable for our collection. Thank you very much.

Shigeru Fujii: Yes, thank you very much.

END OF INTERVIEW