Interview with Taro Shimada, Corporate Senior Vice President & Chief Digital Officer of Toshiba Corporation, President & CEO of Toshiba Digital Solutions Corporation, CEO & Representative Director of Toshiba Data Corporation, Board Chairman of ifLink Open Community

CPS Technology Creates a Society Sharing the Benefits of Big Data

By *Japan SPOTLIGHT*

On Feb. 3, 2020, Toshiba Corporation established its data business subsidiary, Toshiba Data Corporation. This company aims at turning all kinds of collected physical data available today through IoT into usable data by the Cyber-Physical System (CPS) for the benefit of the whole of society. With the advance of the Fourth Industrial Revolution, Big Data obtained by IT will be available to all people. How they can equally share its benefits is a key question in realizing a good digital society.

Japan SPOTLIGHT interviewed Taro Shimada, corporate senior vice president and chief digital officer of Toshiba Corporation, president and CEO of Toshiba Digital Solutions Corporation, CEO and representative director of Toshiba Data Corporation, and board chairman of ifLink Open Community.

(Interviewed on March 11, 2020)

Introduction

JS: Could you please introduce yourself briefly?

Shimada: I joined ShinMaywa Industries, Ltd. in 1990, and worked on aircraft design for Boeing and McDonnell Douglas for around 10 years. In my last assignment I was involved in the design of an amphibious aircraft, the US2, for marine rescues, which was adopted by Japan's Maritime Self-Defense Force. Then I moved to another American company, Structural Dynamics Research Corporation (SDRC), and eventually became CEO of its Japanese subsidiary. SDRC was a rapidly growing enterprise selling software, such as a 3-dimensional computer-aided design system, and it was acquired by Siemens AG, a German company, in 2007. In 2010, I became CEO of one of Siemens's Japanese subsidiaries, Siemens Product Lifecycle Management (PLM) Software Inc., and then in 2014 I had an opportunity to work for Siemens headquarters in Germany where I worked with the principal promoters in Germany of Industry 4.0.

I came back to Japan in 2015 as senior executive and director of the Digital Factory Operation Department at Siemens Japan. I joined Toshiba in October 2018 at the invitation of its CEO, Nobuaki Kurumatani.

As corporate senior vice president and chief digital officer of Toshiba, I oversee the group's overall digitization. I am also the head

Taro Shimada

of Toshiba Digital Solutions Corporation and Toshiba Data Corporation. I recently added board chairman of ifLink Open Community to my resume.

JS: In Germany they are very keen on promoting Industry 4.0 with the introduction of smart factories. I have heard that Japan has been cooperating with them.

Shimada: China also has very strong momentum. It looks as though China is doing everything Germany proposed, and at one time it even looked as if China's implementation was more advanced, even though the original ideas all came from Germany. Japan, however, seems to stick to its own way of doing things, the "Japanese way" if you like. I am very concerned about that, worried about Japan's Galapagos syndrome.

Business Model in Industry 4.0

JS: Industry 4.0 will have a great impact on society. You are advocating for the ideal of a digital society as "a world of links among diversified groups and people benefitting from Big Data as a common asset". Would that mean your business model will make the categories of B2B or B2C meaningless?

CHART

The solution: RAMI 4.0 – the Reference Architectural Model for Industry 4.0

RAMI 4.0 is a three-dimensional map showing how to approach the issue of Industry 4.0 in a structured manner.

RAMI 4.0 ensures that all participants involved in Industry 4.0 discussions understand each other.
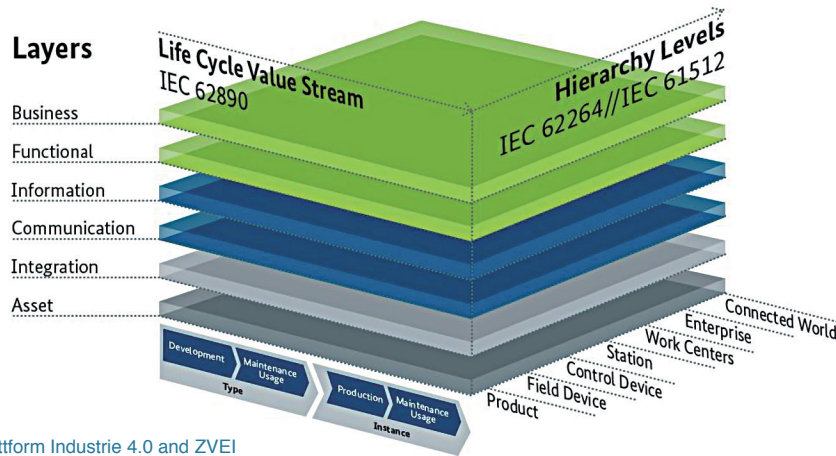
Graphics © Plattform Industrie 4.0 and ZVEI

Source: Federal Minstry for Economic Affairs & Energy

Shimada: I believe that companies that do not embrace the concept of B2B2C will have a very difficult time. Recently, successful companies like Amazon make profits in B2B through information obtained from B2C. Those who limit their businesses to a certain category will be left behind the trend.

JS: As 5G is starting for commercial use, there will be a massive amount of data under transaction at high speed with increased data issuing from digital products. What kind of changes will happen to society with this technology enabling the transfer of data from a physical product like an automobile or home electric appliance to cyberspace?

Shimada: There is a blueprint for this and realizing the world of Industry 4.0, Reference Architecture Model Industry 4.0 (RAMI 4.0) *(Chart)*. This is a three-dimensional map with three axes: a hierarchy of levels, a lifecycle value stream, and layers. In Industry 3.0, it was not possible to communicate beyond the levels. For example, you could not use your smartphone to get data from a fluorescent lamp because they were in different levels of the hierarchy. In Industry 4.0, everything is connected directly. This is realized by the

Verwaltungsschale, referred to as the administrative shell in English, which serves as the standardized communication interface. Many see this as the key to accomplishing the objectives of Industry 4.0.

In a scale-free network, we see what is called the percolation phenomenon. This comes from the fact that when water is subject to enough pressure it vaporizes and disperses instantly. The Internet is a scale-free network. A thing or an act on the Internet is diffused worldwide in the same way, almost explosively. The expansion of GAFA is a good example of this. In a world where everything is connected directly, the percolation phenomenon is a powerful force. That is what Toshiba Data Corporation is aiming for with its "Smart Receipt".

"Smart Receipt" – Toshiba Data Corporation's Core Project

JS: You are also CEO of Toshiba Data Corporation, a Toshiba data business subsidiary. What is your project called "Smart Receipt"?

Shimada: The idea of the "Smart Receipt" was nurtured in the aftermath of the Great East Japan Earthquake disaster of March 11,

2011. With serious shortages of materials in general, there was also a shortage of paper for receipts for cashiers. They wondered if they could issue an e-receipt. That question was the starting point of our project. Toshiba Tech Corporation developed the project and introduced "Smart Receipt" to some retail businesses in 2015. My company, Toshiba Data is now trying to expand the business in earnest in Japan.

Through sales promotion campaigns, we are now seeing significant increase in uptake of "Smart Receipt". We are at a point where 57.1% of consumers at shops promoting the "Smart Receipt" program are applying for it. For campaigns that use paper-based receipts, the uptake rate is only around 5%. Shops can consider customers that use "Smart Receipt" as those who are always interested in them and their sales items, and can notify them of their sales campaigns when they are in the shops. When we surveyed users opinions of receipts, we found that 69% of respondents think paper receipts should be eliminated and 91.5% of them would be ready to use an e-receipt. Very few would stick to paper receipts, as the print on a receipt of heat sensitive paper fades as time goes by.

It is very easy to use a "Smart Receipt": download the application program to your smartphone, get stores using "Smart Receipt" to scan its ID, and then you can use "Smart Receipt" there. You can use it as a loyalty card with the store's point system, and if you also register cash card information in "Smart Receipt", you can make cashless payments. This saves time at the cashier. You can use "Smart Receipt" for proof of purchase for medicines as well, and for simplifying application procedures for health insurance.

If we were to connect and analyze the information of a large number of retailers, we could offer more services with "Smart Receipt". For example, it would be possible for a liquor shop to recommend to a customer who has bought a fish in a fish shop the specific Japanese sake that best suits it. With such an expanded network, it would make it possible to realize connections between producers and consumers. It would be even possible for the buyer of the fish to identify the fisherman and for the fisherman to get to know what kind of dish was eventually made out of the fish. Such possibilities are hidden in this "Smart Receipt" project.

We do not yet know the full potential of "Smart Receipt". One idea is to take advantage of the data of purchases recorded in "Smart Receipt" in medical consultations. During a health check, you may be asked to complete a health survey. In responding to a question like, "How many times do you drink alcohol a week?" you may tend to underestimate the number. But by using the objective data recorded in your "Smart Receipt", your doctor would be able to make a more appropriate medical judgement of your health. Not only on the question of alcohol but also on the question of meals, more objective data could be provided for a doctor, who could then give good advice to avoid excessive consumption of salty food, for example.

I am sure we can use the percolation phenomenon to create a network, and for that reason some of our business partners have

asked us to contract with them to give them a monopoly of the data from the network. However, we believe in the utility of a symbiosis among all the beneficiaries of the system, and we are not thinking about giving any company exclusive access to the data obtained from the network.

JS: If you do not provide your business partners with your data exclusively, can you expect their sincere collaboration in promoting the use of the data in a wide range of business?

Shimada: If we have 100,000 shops taking part in the "Smart Receipt" system, we will get information on purchases with a value of around 40 trillion yen. If you think about this scale, it is not difficult to understand that our business partners understand the merits of sharing our data and cooperating with us. I would also like our system to provide merits for early collaborators. Unfortunately, the proportion of e-commerce to total commerce in Japan is only 7%, and around 90% of the total commercial transactions are not yet linked to the cyber network. We would like to increase the percentage of e-commerce, and we believe that taking advantage of the data collected from physical goods connected with the Internet could contribute to promoting social welfare in Japan.

Challenges in Promoting Use of Big Data

JS: There would be two issues with taking advantage of private information such as customer purchases – the question of privacy and the question of monopoly of such data. How are you planning to tackle these?

Shimada: I think it must be up to users themselves how such personal information is used. In terms of privacy, we would not

provide any personal data to anybody else unless the person permits us to do so. This is what we call prior approval. Our basic policy for privacy protection is to prevent third parties from using personal information unless each individual user finds it valuable.

On the question of possible monopoly of the data, I think successful companies, like GAFA, in the business of data analysis in cloud computing that uses information obtained from a smartphone or PC, in other words data analysis based on data transferred from "cyberspace" to "cyberspace", committed two big errors. The first one was their monopolization of data. They were accused of violating the antitrust laws by European companies. The second one was that they used the data without getting the permission of the individual owner of the data. Though the creation of the General Data Protection Regulation (GDPR) by the European Union addressed this question of privacy, the business of handling personal data still seems to be regarded with suspicion. This is, I believe, a big tragedy for people, because without the smooth circulation of data, business activities in our economy will be significantly slower.

We are very aware of the importance of protecting human rights, and our company has been discussing what should and should not be allowed on this question of privacy with a group of experts from outside the company. We have not yet settled on a general rule, but we recognize that any errors in rule-making could gravely impact on our future business. So we continue our discussions and will be as prudent as possible. I think if any individual considers any business use of their personal information as a violation of his or her privacy, it must be officially interpreted as a violation of privacy. This is a similar concept to the one adopted by the GDPR. Unless we create a system that convinces users that their privacy is firmly secured, we cannot achieve "Data Free Flow with Trust". This is not a matter of law but a matter of business structuring, I believe.

Question of Cybersecurity

JS: Cybersecurity would be a big challenge for your business. In particular, in an age of massive data flow from a physical product to cyberspace I think it would be even more crucial to achieve ensured security. How do you assess Japanese technology's performance in this area?

Shimada: Japan has been trying to ensure security by avoiding connecting physical products with the cyber network. But this is wrong. Going forward, it will be extremely important to enhance security with physical products being connected with the cyber network.

Currently, Toshiba is developing a telecommunication system called Quantum Key Distribution. With this system, the two communicating users would be able to detect the presence of any third party trying to gain knowledge of a shared secret key known

only to them which they can use to encrypt and decrypt messages. We would like to make this a global de facto standard, and will try to do so with the release of commercial use of 5G. When 5G prevails, we think that growing attention will be paid to new technologies like autonomous driving, autonomous control of electric power and autonomous robots, since they could expose human beings to life-threatening crises if any hacker caused them to malfunction. We would like to see this cryptographic communications system widely adopted, as a way to enhance security for those critical technologies.

Contributing to Social Welfare in an Aging Society

JS: Now, I see that Toshiba Group is contributing to enhancing welfare in an aging society by providing people with data on health. In doing so, how would you try to mitigate what we call the "digital divide" between elderly people and the younger generation?

Shimada: We plan to make IoT much easier to work with than it is now. We made an IoT platform called ifLink, and I am the board chairman of "ifLink Open Community". With this, even older users without any knowledge of digital technology could easily program the home electric appliances connected with their smartphones. They can just pick up a card with "If" and another one with "Then" and make a program such as "*If* the door is opened, *then* switch on the light". They can choose the action they want, and once the programming is done, they do not have to use the smartphone. This would be easy for the elderly.

With the expansion of IoT, it will be important that anybody can use it cheaply and easily. To achieve it, we made this platform open to everybody. Anybody can make an "If-Then" program and around 100 companies from a variety of sectors have announced their support for ifLink. I believe we will see a wide variety of IoT and many products emerging from diverse companies. Many kinds of IoT will be created by spontaneous combination of these products depending on users' preferences, in areas like infrastructure, automobiles, home security and delivery services.

ifLink is really simple software but if people find it interesting and it prevails all over the world, a scale-free network will be automatically born. There would be an infinite number of combinations among the products. My presentation of ifLink at the World Economic Forum in Davos in 2020 was very well received by the audience. We look forward to seeing this platform make great progress. JS