

# Financing Smart Cities

How can financial institutions work to ensure that attempts to realize smart cities are fostered into long-running rather than transitory projects?

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### Financing the Smart City

#### - Funding for the Challenge of Urban Innovation -

Kazuhiro Higashi

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Smart cities: an attempt to realize sustainable cities through the use of new technologies such as ICT. Efforts in this area are underway in various parts of Japan. However, there is still no clear path to success. How do we ensure that smart city projects are not merely transitory, and secure business continuity and economic efficiency into the future? How should we address the challenges of financing smart cities? How should financial institutions work to innovate cities? In this issue of *My Vision*, we asked the opinions of Japanese and overseas experts in this area.

Keywords...Risks and challenges, well-being of residents, role of financial institutions, urban innovation

## Expert Opinions

### Financing Smart Cities

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CEO, Cure Brain Cancer Foundation

Keywords...Public-private partnership (PPP), stakeholder understanding, time horizon, risk underwriter

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Chief Senior Consultant, Sumitomo Mitsui Trust Research Institute Co., Ltd.

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Special Advisor, United Nations

Keywords...Resilience finance, urban risk, clarification of risk-return tradeoffs, hazard data

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General Manager, Innovation Center, The Japan Economic Research Institute

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Accenture Innovation Center Fukushima Center Co-Lead / Managing Director

Keywords...Opt-in method, City OS, CFO of regional economy, digital regional currencies

#### Expand the Possibilities of Financial Businesses Through Wide-Ranging Utilization of Data

Hideo Yamamoto

Executive Manager, Digital Strategy Section, Business Strategy Department, Financial Segment, NTT Data Corporation

Keywords...Cashless payment, sensing finance, trustworthiness of data

Interview period : June – July, 2021

Interviewer : Sosuke Suzuki (NIRA Research Coordinator & Research Fellow )

About This Issue

# Financing the Smart City

## – Funding for the Challenge of Urban Innovation



**Kazuhiro Higashi**

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The concept of the smart city seeks to realize more efficient and sustainable cities through digitalization and the use of new technologies such as ICT. The realization of the smart city is expected to offer one solution to the diverse problems faced by cities, including responses to climate change, and efforts in this area are underway throughout the world. However, the path to success remains uncertain. The project to realize Masdar City in the UAE, an advanced exemplar in this area, has been extended significantly; Canada's Sidewalk Toronto project was cancelled. It has been pointed out that neither project resonated with residents, and the OECD and others have indicated that contribution to the well-being of residents should be emphasized over the creation of new economic opportunities. It is desirable for all parties concerned, citizens in addition to the government and businesses, to agree in

their awareness of precisely what a smart city project is aiming towards.

In this issue of *My Vision*, we interviewed six experts in the field regarding their thinking concerning the risks and issues associated with smart cities, in particular, from the financial perspective, how to secure business continuity and economic efficiency. Another focus was the role to be played by financial institutions in smart city projects advanced by public-private partnerships in Japan.

### It Will Be Essential to Create Mechanisms for Financing

A city is a “commons”, a common area for use by citizens. While services for citizens will be improved by making cities smarter, citizens will not directly pay for construction, maintenance and management due to the fact that these are projects for the public good. The development of smart cities is currently largely funded by government subsidies, but ongoing financing will be required in order to extend such projects across the longer period of decades to come. The risks and issues associated with smart cities come into focus here, and it will be necessary to devise the means of overcoming these difficulties.

Lance Kawaguchi, CEO of the Cure Brain Cancer Foundation, an expert who has been involved with financial institutions for over 25 years and has been engaged in smart city projects around the world, cites “PPP” (public-private partnership) as the framework best suited to the realization of smart cities. The desirable business model, as indicated by Mr. Kawaguchi, is as follows: the initial funds are provided by the government, which absorbs the development risks, following which it is possible to refinance using private financial institutions. A variety of companies then enter the market and develop their businesses, creating an ecosystem that generates profits. Mr. Kawaguchi also proposes specific ideas to assist in facilitating the involvement of private financial institutions, which will serve as valuable reference points.

Hiroto Asakawa of Mitsui Sumitomo Trust Research Institute, Co., Ltd., who also writes about investment methods for smart cities, introduces an investment fund created and managed by an Australian asset management company. By forming business alliances with companies that excel in specific technologies, the fund is able to cooperate with these companies to deal with “technological risk,” the risk that a new technology that has been the subject of investment will become obsolete due to technological progress. In addition, standardization of the services provided is another aspect of this scheme. The deployment of standardized services in multiple cities has the potential to allow the

exploitation of economies of scale and improve profitability.

However, there are limits to such a scheme in isolation. How can the data collected by digital technology be used to increase the potential for financing? United Nations Special Advisor Daniel Stander advocates a financing method that allows the terms of loans to be varied depending on risk assessments based on urban disaster data. The use of reliable data in combination with a model that measures the value of a city's resilience will drive investment and lending.

In the case of smart cities, it is likely that the connection between “who” (or “what” ) and “how” will hold the key to financing.

## **Financial Institutions Should Play a Central Role in Realizing Smart Cities**

Data utilization links residents, businesses, governments, and investors. The digitalization-driven evolution of the region in which they are present can be pointed to as the foundation for the cooperation between them. What is the role required of financial institutions in smart cities where such cooperation is the key to increasing value?

According to Takeharu Kikuchi of the Japan Economic Research Institute, who is also professionally involved with a government-affiliated financial institution, financial institutions should “become coordinators of consortiums that include multiple companies from different industries and local governments, which will shape the businesses in smart cities”. Mr. Kikuchi sees the role of financial institutions on this stage as adopting a business-oriented focus and connecting companies across different industries.

Mr. Shojiro Nakamura of Accenture Co., Ltd., who is leading a smart city project in Aizuwakamatsu City, also wants financial institutions to be involved in the operation of a regional platform for the collection and management of data with the consent of residents. He would like financial institutions and local managers to be involved in the operation of the project based on its founding concept that residents and the community are the main actors, and also to improve the project's economic efficiency.

Hideo Yamamoto of NTT DATA Corporation offers recommendations from the perspective of the digitalization of financial institutions. He tells us that the role that financial institutions should play in smart cities is, first, “to make cashless payment more widespread”. Mr. Yamamoto points out that smart cities represent a unique opportunity to obtain regional data “en bloc”, and that this could be the starting point for the creation of new businesses using data.

The proposals of each of these three interviewees expand the scope of the financial industry beyond the traditional three major operations of banks: deposits, loans, and exchange.

Financial institutions have always been a part of their regions. They cannot make profits independently, despite the decline of the regions in which they operate. They receive a special trust precisely because they are a part of their region, and on top of this, they fulfill an “area management” role precisely because they are the recipients of information regarding local residents and local companies. Rather than viewing loans and investments in units of one company or one project, with their entry into the arena of the smart city, financial institutions should make the transition to viewing their regions as “citizens x areas x data”, and adopt a concept of maximizing the degree of well-being of residents by increasing the value of all three of these elements.

The banking industry is on the brink of transformation into a financial services industry. What is demanded of it is to take on the challenge of urban innovation without being bound by the behaviors and frameworks that have hitherto been the norm for financial institutions.

Kazuhiro Higashi is a NIRA Executive Vice President, Chairman and Director, of Resona Holdings, Inc., and Chairman and Director of Resona Bank, Limited.

Expert Opinions

## Make Public and Private Sector Collaboration More Effective with the Involvement of Financial Institutions

*Lance Kawaguchi is the Chief Executive Officer at Cure Brain Cancer Foundation and shares his extensive knowledge in this article in support of smart cities globally. Lance has taken a career break from the Finance and Banking industry to focus on something bigger than himself, inspired by a promise he made to his mother shortly before she passed away from cancer.*



**Lance Kawaguchi**  
CEO, Cure Brain Cancer  
Foundation

I have been involved with financial institutions for more than 25 years, working with projects seeking the realization of smart cities in locations across Europe, Asia, and the Middle East. Based on my experience, I believe that a public-private partnership (PPP) is the best approach to take. In this framework, the government provides the initial funding, and then makes it possible to refinance via private financial institutions. A variety of companies will then enter the market, develop businesses and generate profit. Building this type of ecosystem is the desirable economic model for the realization of smart cities.

Globally, there are strong examples of how the PPP/smart city model works, however it is important to identify that despite ample government subsidies, funding alone is not enough to ensure success. A project will potentially fail if the parties involved are not on the same page regarding what they are trying to achieve. In order to prevent a situation of this type from occurring, it is essential to ensure that all the parties concerned share a common understanding.

Successful smart cities rely upon two key points. The first is recognizing the time horizon. The public sector may view projects as having a time frame of thirty to fifty years, while financial institutions are interested in profits over two to three years. If financial institutions propose business improvement measures and mechanisms are created in order to generate profits in a short time frame, the parties concerned may have to meet in the middle.

The second, is a shared understanding (between the risk takers) as to who will take which specific risk. The active participation of banks and private equity providers will be essential. The government will shoulder the development risk and the private sector will then take the risk of developing profitable businesses. Rather than financing using a single bank, it would be wise to adopt realistic measures such as forming a syndicate of multiple banks to diversify risks. In addition, it would be necessary to take the nature of contracts into consideration. Projects will run for a long time, and technology will evolve over the same period. It will be important to ensure that contracts make it possible to review details, and in some cases renegotiate or cancel the contract, in order to allow response to changes in these situations.

Locally, during my time in Australia I have noted that public awareness of smart cities is modest, however it is an ideal location for investment. Australia's population is predominantly anchored to coastal-adjacent capital cities which support an efficient and connected network to reach a significant number of people in a short timeframe. Additionally, there is easy-to-access operational infrastructure that can be utilised or improved to enhance IoT connectivity, providing investors with a usable base that may not be available or as easily accessible in other countries. Finally, Australia has historically welcomed Foreign Direct Investment (FDI) and offers a stable, strong, and regulated financial system and machinery of government, contributing to a safe investing environment. There is a strong case for Australia to become a world leader in smart cities and smart city technologies, and if encouraged by FDI, likely to be beneficial to both Australian and global investors.

Ultimately, it will be necessary for financial institutions to not only pursue profitability, but also to make a transition in their thinking, from a politically neutral standpoint, towards the fulfillment of their social mission in improving urban sustainability and citizens' lives.

Mr. Kawaguchi has more than 25 years of experience in the global financial industry, including periods with Citigroup, the Australia and New Zealand Banking Group, and HSBC. At HSBC, he was the Managing Director and Global Head – Corporates for the company's Global Liquidity and Cash Management division. A graduate of Indiana University Bloomington, he is also the author of numerous articles studying the digitalization of the banking sector, looking at topics such as open banking and smart cities. Mr. Kawaguchi is the winner of numerous awards honoring his efforts in the area of racial and gender diversity, including the BAME 100 Board Talent Index. He has held his current position, as the Chief Executive Officer of the Cure Brain Cancer Foundation, since 2021. Lance has revolutionised the Foundation's structure and culture, ensuring the organisation can work efficiently to unite the brain cancer community and increase survival and quality of life.

Expert Opinions

## Seek Financing Methods Based on the Characteristics of Smart Cities



### Hiroto Asakawa

Chief Senior Consultant,  
Sumitomo Mitsui Trust Research  
Institute Co., Ltd.

The realization of smart cities is one facet of permanent urban development. In order to procure the funds for the creation of smart cities, it would therefore be desirable to combine transient funding, such as government subsidies and private-sector donations, with ongoing mechanisms able to provide long-term investments.

On the other hand, the digital technology that forms the basis of smart cities and the business models that utilize it are fields that are constantly advancing, meaning that even the new technology that we have invested in may become obsolete in a few years. Furthermore, projects like smart cities, which are highly public and display significant differences from region to region, are generally difficult to “monetize”, thus making it difficult to realize long-term investments and loans. And this is precisely why it is essential to seek financing methods that take into account these characteristics of smart cities.

Attempts to overcome these challenges have already begun. For example, an Australian asset management company has established and is managing a fund for investment in smart city infrastructure development projects. Business alliances between companies that excel in a specific technology and funds enable the standardization of the services provided and their deployment in multiple cities. Mechanisms of this type will make it easier for companies and funds to work together in order to respond to technological problems and obsolescence (so-called “technological risk”). The fund is investing in such businesses as optical fiber network installation in the United States, and will see a return on its investments over the long period of 10 years or more. This will surely provide a useful reference for methods of overcoming issues such as technological risk.

Projects that are highly public but difficult to monetize can also consider the use of a method of financing called “impact investing”. Impact investing focuses not only on the economic returns, but also on the social and environmental effects resulting from investments, and is a form of investment that is rapidly taking root in Japan and overseas. And precisely because smart cities are one facet of sustainable urban development, many businesses can be targets for impact investment. In particular, local financial institutions, which have close ties to local communities and are familiar with their issues, can ultimately play a major role through the use of this method.

Numerous smart cities will enter the stage of concrete social implementation from this point on. It will be desirable for financial institutions to participate in regional consortiums and similar working groups from as early a stage as possible in order to enable them to understand social issues specific to particular regions. In addition, this can be expected to contribute to the formation of “bankable” smart cities that make possible the long-term loans and investments that are indispensable to solving those issues.

Mr. Asakawa is engaged in research and consulting related to areas including PPP and infrastructure investment at Sumitomo Mitsui Trust Research Institute, Co., Ltd. Published in March 2021, “Research on Investment Fund Methods to support Smart City Development” (in Japanese) is one of the rare reports that systematically investigates and researches smart city financing methods. Mr. Asakawa joined Mitsui & Co., Ltd. in 1997. He has experience in domestic and overseas project finance formation, infrastructure fund formation and management and other areas at the company. He has been in his current position since 2020.

Expert Opinions

## Data & Finance: A Virtuous Circle



**Daniel Stander**

Special Advisor, United Nations

Cities are assets. They are solutions for and drivers of economic and human development.

Smart cities are defined by their use of data. In short, they collect data to enhance services to citizens.

However, all cities – smart or otherwise – are already fiscally challenged. Indeed, most cities in the developing world struggle to finance the infrastructure required to meet the basic needs of growing populations.

This municipal financing gap reduces urban efficiency and throttles economic activity. Budgetary shortfalls follow, creating a vicious cycle that can choke urban conditions and stymie socioeconomic development.

Factor in the potential impacts from climate-related shocks and stresses, and cities, instead of being an asset in the fight for sustainable development, can themselves become a sustainable development problem.

All is not lost, however. Data, the currency of smart cities, is also the currency of smart finance. Just as a smart city collects data to surface insights that improve operations, so capital is motivated by data-driven returns.

This shared interest in data presents an opportunity to reverse the cycle. Data becomes not just the enabler of a smart city; it also enables smart municipal finance. And when the data being collected informs stakeholders' understanding of urban risk, [#ResilienceFinance](#) becomes possible.

In its vanilla form, this looks like the kind of [parametric bond](#)<sup>i</sup> [New York has repeatedly issued](#) to finance climate-resilient transportation in and around Manhattan. [More innovative flavours](#), which reward governments for their investments in measures that reduce risk, were pioneered following the 2017 hurricane season. They include the [four instruments that were designed by the UK Government in 2018](#) and taken forward by Lloyd's of London in their report on [innovative finance for resilient infrastructure](#)<sup>ii</sup>. UNDP reviewed progress in 2020, citing three case studies the demonstrate [how private investment can shape climate-smart and sustainable cities](#).

The success of such instruments to finance municipal resilience is predicated on the availability of high-resolution, accurate and objectively verifiable hazard data from sensors. When such data is [consistently captured](#) and responsibly disclosed, cities can unlock access to new instruments and new investors – not to mention develop risk-informed plans and garner favour from credit rating agencies.

Of course, sensor data alone does not suffice. Trusted data needs to be married with forward-looking analytical models that can effectively price risk and value resilience in the Anthropocene. Technical capacity also needs to be built – and inadequate regulatory frameworks need to be reformed.

But it all begins with 'truth data'. When cities invest in data collection and enabling environments, they can not only improve their services to citizens, they also clarify the risk-reward tradeoffs in ways that bring over-capitalized investors to the table.

There is no single financial product that will close the municipal funding gap. But data-driven cities are more likely to deliver climate-resilient services and attract funds.

In other words, smart cities and resilience finance are mutually reinforcing. Together, they stimulate a virtuous cycle of growth and prosperity. Properly embraced, they will help cities stand strong even when things go wrong.

<sup>i</sup> Catastrophe bonds, a type of risk-linked security, are structured debt instruments designed to raise money in the event that a predetermined disaster occurs. Parametric cat bonds are structured around the numerical values of physical phenomena, such as the wind speed of a typhoon or the depth of a flood at specified locations, rather than the actual sum of the loss incurred from an event.

<sup>ii</sup> LLOYD'S (2018) innovative finance for resilient infrastructure

As a special advisor to the UN, Mr. Stander focuses on risk and finance. He is a pioneer in the field of resilience finance, finding responsible investments in the face of climate change and potential disasters. Mr. Stander is the Deputy Chair of the Resilient Cities Network, and was formerly Global Managing Director of Risk Management Solutions. He holds a Master's degree from Oxford University.

## Become Coordinators of Cross-Industry Collaboration



**Takeharu Kikuchi**

General Manager, Innovation  
Center, the Japan Economic  
Research Institute

Smart cities are initiatives that seek to improve the level of citizens' well-being using data. The fields treated in smart city initiatives cover a wide range, including regional transportation, medicine and welfare, energy, waste, and disaster prevention. Some of these involve equipment and facilities, and some do not. "Greenfield" projects, which create a new site and develop infrastructure from scratch, require an enormous amount of funds from the beginning. However, in Japan, there are many "brownfield" projects, which attempt to enrich lives using IT and data in sites in which people already live. At the initial demonstration stage, these projects are usually financed by subsidies or self-financing by core companies; many projects in

Japan are still at this stage. When the stage of commercialization and implementation involving constructed facilities is reached, it will be possible to seek funds from financial institutions.

But this does not mean that financial institutions have no role to play at present. They actually have another important role to play. What financial institutions should do is to become coordinators of consortiums that include multiple companies from different industries and local governments, which will shape the businesses in smart cities. Local governments can play important roles such as providing explanations to residents, but they are poor at creating business models. Combining ideas and thinking about how to turn them into a business is the forte of financial institutions. The local connections and information that financial institutions possess come into play here. The situation may be chaotic and some time may be required in the early stages, but once the project has taken overall, this approach will lead directly to the provision of long-term finance.

"Social impact bonds" are attracting attention as a financing method that has good compatibility with smart cities. Against the background of increasingly complex social issues and increasingly severe constraints on public-sector finances, this is a result-linked public-private partnership method in which dividends are paid to the providers of funds depending on the results a business produces. As KPIs (Key Performance Indicator, indicators for evaluation) that measure results, items are set for which data can be obtained, for example the completion rate of health guidance programs for reducing the number of diabetic patients. Currently, there are still not many projects as such, but the participation of financial institutions in all aspects, including determining the applicability of this scheme, cooperation with local governments and the national government, and investment, will be required. As a means of responding to social demands, it will be essential for financial institutions to actively participate, accumulate expertise, and support the creation of truly sustainable mechanisms at the stage of commercialization of smart cities.

Mr. Kikuchi is working to create opportunities for open innovation (iHub) and is involved in the planning of smart cities at the Japan Economic Research Institute. He also serves as the Manager of the Innovation Promotion Office of the Development Bank of Japan's Business Planning and Coordination Department, working to support new businesses through the provision of funding and consulting. Prior to taking his current position, Mr. Kikuchi was Manager of the Development Bank of Japan's Environmental & Social Evaluation Office, was seconded to the PFI Promotion Office of the Cabinet Office and the General Environmental Policy Bureau of the Ministry of the Environment, and was a Deputy Manager of the DBJ's Kansai Branch. Mr. Kikuchi is also well-versed in the field of green finance. A graduate of The University of Tokyo, he completed a Master's degree in environmental management at Oxford University.

Expert Opinions

## Local Financial Institutions Should Be Central to Regional Management in the Digital Age



**Shojiro Nakamura**

Accenture Innovation Center  
Fukushima Center Co-Lead /  
Managing Director

One factor in smart city initiatives is whether they are able to generate valuable data in their particular region. Anonymous data, such as data concerning flows of people, does not generate monetary value, no matter how much of it there is. The data that creates value is the data that identifies the behavior history, purchase history, health information, and household energy use information of each local resident. Connecting data from multiple fields related to individuals' lives across sectors enables useful services to be provided.

The prerequisite for building up valuable data is sympathy among citizens for the concept of smart cities and their clear consent for the utilization of their data (i.e., use of an “opt-in” method). The Smart City Aizuwakamatsu project that we are involved in in Fukushima Prefecture's Aizuwakamatsu City comprehensively implements an opt-in system under which data is utilized for the development of the region and its industries based on the desires of the city's residents. Operationalizing data obtained with the clear consent of the citizens via a regional platform called “City OS”, we are able to provide services to citizens in numerous areas including healthcare and cashless payment. We are thinking that we would like financial institutions and local managers to be involved in the operation of the project based on our concept that residents and the community are the main actors, and also to improve the project's economic efficiency. Aizuwakamatsu City's “City OS” is operated by a local management corporation, and the service that acts as a DX for the city administration utilizes contributions. If we establish a 20- to 30-year long-term infrastructure fund, it should lead to stable and continuous operation.

We would also like financial institutions to play the role of CFO (Chief Financial Officer) of the regional economy. SMEs, including startups, lack CFOs. In particular, we want regional banks to use digital technology in order to provide a variety of financial advice to SMEs in cooperation with IT companies.

In addition, we would like financial institutions to take initiatives in the area of cashless payment. Unless we achieve 100% cashless payment, the region will not be fully digitalized. Currently payment service providers offer services; fees are high and there is a time lag for cashing, and cashless payment is therefore not progressing. To solve these issues, it will be necessary to introduce digital local currencies, and the participation of banks will be essential to this.

After joining Accenture in 2011, Mr. Nakamura was appointed the Lead the Accenture Innovation Center Fukushima Center, which was established to assist in the reconstruction of Fukushima Prefecture and Tohoku following the Great East Japan Earthquake. He moved his residence to Aizuwakamatsu City in order to provide reconstruction support. From 2014, Mr. Nakamura shifted his focus from reconstruction to regional revitalization in order to promote the regional revitalization. Advocating a concept of decentralization as opposed to the concentration of the population in metropolitan areas, he has nominated Aizukawarazu City as a demonstration area. He is promoting projects that seek to realize smart cities and regional revitalization through a digital transformation, and working to create a regional revitalization model based on Aizuwakamatsu City and to expand successful cases nationwide.



Expert Opinions

## Expand the Possibilities of Financial Businesses Through Wide-Ranging Utilization of Data



**Hideo Yamamoto**

Executive Manager, Digital Strategy  
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NTT DATA Corporation

The role that financial institutions will be required to play in the advancement of smart cities will be, first, to make cashless payment more widespread. For financial institutions, smart cities represent a unique opportunity for the collection of payment information in a region en bloc, as digital data. This is an opportunity that must not be missed. With the rise of payment service providers, it has become difficult for banks to obtain household expenditure information that was previously available to them, information on how much each household spent and on what, for example electricity, gas and water. Having access to this information again will allow banks a better understanding of their customers. This applies not only to individuals but also to corporations. The basic story of business development is to acquire local payment information and then to utilize it for marketing or in a new business.

We are proposing the use of “sensing finance” to allow financial institutions to develop their businesses through the utilization of a wider range of data. This involves increasing the sophistication of conventional financial products and services by utilizing new data. If the target company was in the manufacturing industry, smart meters would be used to acquire data concerning electricity usage, allowing estimation of the operating status of the factory, for example. Based on this data, it is possible to predict the performance of the company, change the lending interest rate, and adjust the loan repayment method. In the case of small businesses, if water and electricity usage data can be obtained, the daily operating status of the business can be monitored at low cost, making possible low-interest loans.

A startup company called Global Mobility Services is developing a business involving the provision of loans based on data. The company operates mainly in Southeast Asia, but has also commenced offering its services in Japan. When a customer takes out a loan to buy a car, the company attaches a special device to the vehicle. This device can acquire customer behavior data and, if the loan repayment is delayed, immobilize the vehicle, allowing it to be repossessed. It is a business model that mainly targets the poor, and it will make it possible to provide loans to people and companies that were not previously eligible for financing. However, given that some customers may manipulate data to commit fraud, measures will be required to maintain the trustworthiness of the acquired data.

At NTT DATA Corporation, Mr. Yamamoto contributes to increasing the sophistication of data management in financial institutions. He has made numerous proposals regarding the future image of finance based on broad-ranging knowledge of fields including IT grand design and the utilization of big data. Mr. Yamamoto is the creator of the new term “sensing finance”. He is responsible for the financial edition of “NTT DATA Technology Foresight”, which brings together trends in technology, and he also disseminates information on IT trends as this area of advanced technology relates to finance. Mr. Yamamoto is a graduate of Keio University.