CONCEPT

Attractive Urban Developments Achieved through Fusion of OT, IT, and Products
Hitachi's Urban Solutions

With Japan's population now beginning to decline, there is a pressing need for ways of generating more vitality in cities and making them attractive. Internationally, too, the challenge as populations are increasingly concentrated in cities is to achieve sustainable urban development while also dealing with issues like alleviating traffic congestion and providing safe and secure public infrastructure. Working with customers from a variety of different fields that underpin urban living, including railway stations and other buildings, lifestyle and social infrastructure, and mobility, Hitachi is using its Lumada IoT platform as a basis for supporting the provision of new value to city stakeholders through the collaborative creation of solutions that incorporate digital technologies. This article describes what Hitachi is doing in the field of urban development with the aim of creating attractive places to live and improving the experiences and QoL of the people who live in and utilize cities.

Expectations for New Urban Developments

The term "machizukuri," which loosely translates as "urban development," has entered widespread use in Japan over recent years. While lacking a precise definition, its meaning goes beyond the provision of urban spaces such as parks or buildings and is also often heard in the context of local government, businesses, and residents working together to build new communities, including factors such as culture, the economy, and the environment.

Many of the major cities in Japan have their origins as castle towns or as towns built around a temple, with various other towns arising of their own accord in the surrounding areas, such as staging post towns along land transportation routes, port towns that serve as hubs for water transportation, and country towns that earn their living through the manufacture of goods. As these towns developed, they also served to tie their respective regions together.

As residential areas then went on to expand into land developments on city outskirts against a background of population increase and rapid economic growth, the increasing geographical separation of living and working places weakened the sense of community and the power of self-governance by residents that had underpinned Japan's townships in the past. The subsequent bursting of the economic bubble and repeated natural disasters brought various urban challenges to a head and led to growing concern about what form towns and cities should take. With the rapidly aging population and low birth rate of recent times having been a factor in rural depopulation and the ongoing people flow to the cities, the need to find ways to keep communities working and to improve their vitality and value has become urgent.

Looking at the world as a whole, the concentration of populations in cities is accelerating. The

2014 Revision of World Urbanization Prospects published by the United Nations predicts that the global population will reach about 8.5 billion in 2030 due mainly to population increase in emerging nations, with approximately 5.1 billion (60%) of those people living in cities. The concentration of populations in cities brings problems such as traffic congestion, energy and water shortages, and the pollution of the environment, while also making it difficult to respond to major disasters.

Rather than just functioning as living and working places, what will be required of the cities of the future are platforms that are also able to overcome the above challenges and improve the quality of daily life and business. Accordingly, what will be needed will be urban developments that incorporate the concepts of "machizukuri," utilizing technologies and services that have been developed with consideration for improving the quality of life (QoL) of the people who live in these cities and for the value of the experiences they provide to the people who use these cities.

Encouragement for Digital Transformation of Cities

Society is currently experiencing a "digital transformation" in which business models and economic and social systems are being transformed by the use of Internet of Things (IoT) technology to link a variety of different devices to networks and the application of technologies such as big data analytics and artificial intelligence (AI) to the different types of data collected. Indicative of this is Society 5.0, an initiative of the Japanese government aimed at bringing about its future vision of a "super smart society," with the emergence of services that, through the use of rapidly advancing digital technology, can be tailored more closely than ever before to the needs of individual users.
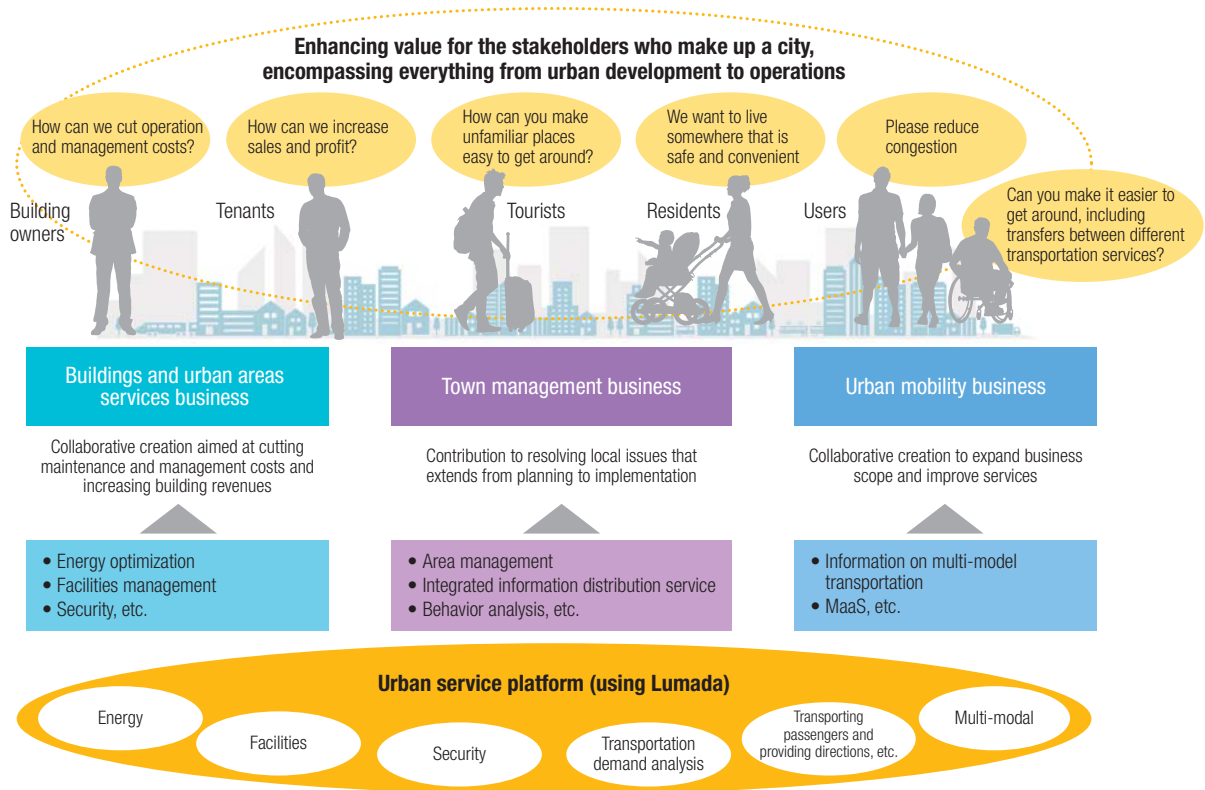
Having been quick to catch on to this trend, Hitachi has been operating its Social Innovation Business since 2010. This business aims to resolve the challenges facing its customers and other parts of society through the collaborative creation with customers of solutions that combine the latest information technology (IT) and products with the operational technology (OT) for control and operation that Hitachi has developed primarily through its social infrastructure systems business. It can also be described as a business that supports improvements to operating practices and the creation of value through digital transformation.

To provide a further boost to collaborative creation with customers, Hitachi underwent a restructuring in April 2016 whereby it adopted a new organizational structure in which its operations are run as separate business units (BUs). Hitachi has also strengthened the centralization of operations within each area of business, having established BUs in each of the four areas designated as the main focus of its Social Innovation Business, namely electric power and energy; industry, distribution, and water; urban development; and finance, social, and healthcare. Within the urban development area, Hitachi operates a building systems BU, railway systems BU, smartlife and ecofriendly systems division, and automotive systems division. The aim is to create new value in towns and cities not only by each of these organizations growing and expanding its own business but also through synergies with other businesses (see Figure 1).

Challenges Faced by Organizations Engaged in Running Cities

Cities where large numbers of people live and work are made up of a variety of urban amenities, including buildings, mobility, commerce and

Figure 1 | Objectives of Urban Solutions

Enhancing value for the stakeholders who make up a city, encompassing everything from urban development to operations

- How can we cut operation and management costs?
- How can we increase sales and profit?
- How can you make unfamiliar places easy to get around?
- We want to live somewhere that is safe and convenient
- Please reduce congestion
- Can you make it easier to get around, including transfers between different transportation services?

Building owners | Tenants | Tourists | Residents | Users

Buildings and urban areas services business	Town management business	Urban mobility business
Collaborative creation aimed at cutting maintenance and management costs and increasing building revenues	Contribution to resolving local issues that extends from planning to implementation	Collaborative creation to expand business scope and improve services
• Energy optimization • Facilities management • Security, etc.	• Area management • Integrated information distribution service • Behavior analysis, etc.	• Information on multi-model transportation • MaaS, etc.

Urban service platform (using Lumada)

Energy | Facilities | Security | Transportation demand analysis | Transporting passengers and providing directions, etc. | Multi-modal

MaaS: mobility as a service

manufacturing, administration, tourism, education, communications, and energy supply. Given the reappraisal of the form and value of cities in the ways noted above, the organizations involved in providing these amenities are faced with a number of challenges.

One example is, as to operating offices and other commercial buildings, the need to reduce management costs by optimizing the operation of elevators and air conditioning and to provide greater added value that will lead to securing reliable tenants. In the case of infrastructure such as that for communications and energy, optimizing cost and maintaining disaster preparedness together with security of supply are being sought, while local governments (the core organizations within a city) are looking at as a way of improving the level of satisfaction among residents. Mobility is a core urban amenity and the demands in this area include alleviating congestion and providing comfortable ways of getting around using railways

or roads, and also increasing revenue by enhancing the attractiveness to consumers of railway station complexes and other commercial facilities.

To be able to respond to these challenges and meet demand, Hitachi has broadly divided its provision of urban solutions into three separate business areas, namely services for high-rise districts, town management, and urban mobility. This involves working with other BUs or partner businesses that possess know-how in urban development and operations on the collaborative creation of solutions that utilize digital technology.

Aim of Maximizing Value in Three Sectors

The business that deals with services for buildings and urban areas utilizes IoT technology to provide services that enhance the value of buildings. One example is the use of a network to link together the various facilities in a building, including air

conditioning, lighting, surveillance cameras, elevators, and escalators, thereby enabling optimal control of these facilities based on real-time analyses that combine collected data with data on the people flow inside the building. Other activities include providing facilities management services that use the analysis of sensor data such as electric power consumption or temperature and humidity to optimize the operation and maintenance of equipment as well as for the visualization of energy use or to improve energy efficiency, and workplace optimization services that suggest how to better utilize desks, meeting rooms, and office space by monitoring them with sensors.

The business also contributes to developing buildings and urban areas that provide value and comfort both to those who own and manage the buildings and those who use them, including the collaborative creation of solutions that support the workplace reforms of tenants.
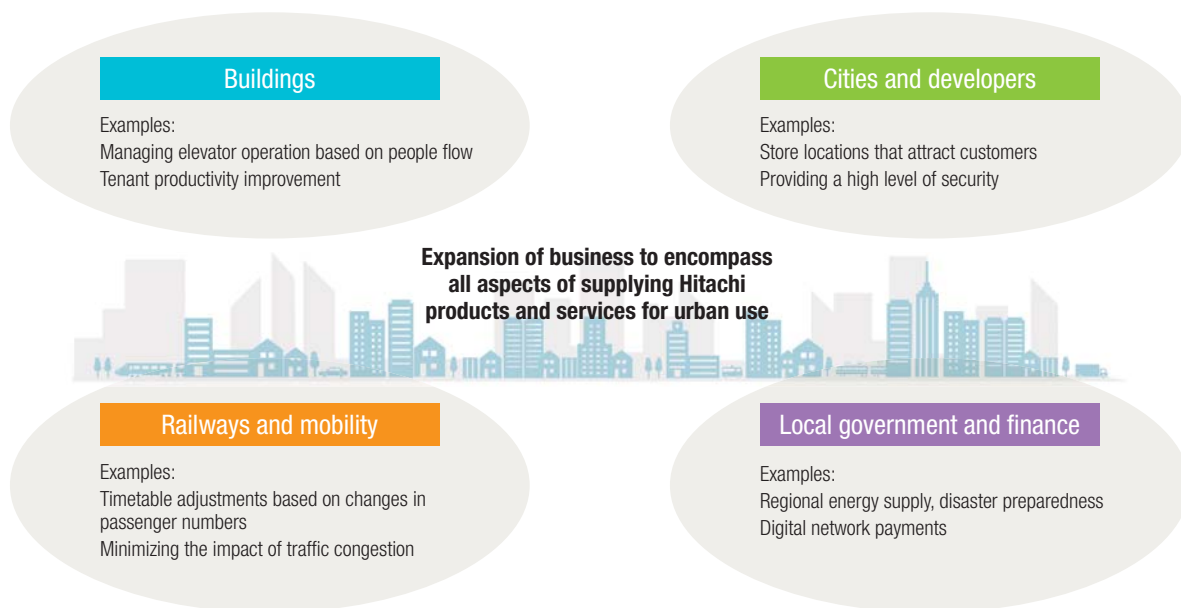
The town management business collaborates with community stakeholders as it works with its customers on how to bring vitality to commercial districts or entire regions, covering everything from identifying the issues through to finding solutions. At Kashiwa-no-ha Smart City at Kashiwa City in Chiba, Japan, Hitachi is supporting the development and operation of an attractive community with an enhanced level of satisfaction among both residents and visitors, having developed and supplied an area energy management system that performs efficient operation, monitoring, and control across the entire area, while also continuing to assist with the adoption of the latest equipment and services. Hitachi is contributing to the creation of sustainable cities by drawing on these and other past activities of its smart city business to work on things like comprehensive measures for reducing resource use or making efficient use of renewable energy by utilizing advanced technologies.

For customers who operate large shopping centers or railway station complexes, Hitachi supplies solutions for creating lively spaces that boost sales and increase repeat visits in ways that include the use of digital signage to suggest routes that minimize crowding, the provision of timely information to users, and links to payment services. These solutions rely on the real-time analysis of the people flow within an area while also interoperating with railway traffic management and other systems.

The urban mobility business aims to make it easier to move around in cities by enhancing interoperation among railways, vehicles, and other forms of transportation infrastructure and by establishing multi-modal transportation networks. Hitachi's past achievements include supplying a full range of products to the railway industry, extending from rolling stock to systems such as those for reservations, traffic management, and passenger information; supplying the automotive industry with everything from key vehicle parts to important components needed for autonomous driving and navigation systems; and supplying systems that support electronic toll collection (ETC), traffic management, and other intelligent transport systems (ITSs).

Based on those past achievements, Hitachi is helping to make railway stations and communities more attractive by utilizing digital technology. It utilizes digital technology to collect and analyze operational data from transportation agencies together with other data on things like demand and congestion, to make it easy for users to transfer between services, to minimize congestion, and to provide comfortable on-demand mobility. With the growth in overseas visitor numbers, Hitachi is also helping to maximize the value of cities in the mobility sector by working with customers on multi-modal navigation services that provide

Figure 2 | **Business Strategies for Urban Solutions Sector**

Buildings
Examples:
Managing elevator operation based on people flow
Tenant productivity improvement

Cities and developers
Examples:
Store locations that attract customers
Providing a high level of security

Expansion of business to encompass all aspects of supplying Hitachi products and services for urban use

Railways and mobility
Examples:
Timetable adjustments based on changes in passenger numbers
Minimizing the impact of traffic congestion

Local government and finance
Examples:
Regional energy supply, disaster preparedness
Digital network payments

enhanced convenience for diverse users, and on ride sharing, car sharing, and other forms of mobility as a service (MaaS).

Contributing to Future Urban Development through Global Collaborative Creation

Hitachi's strength when it comes to achieving this value creation is its experience and past achievements in working with customers from a wide variety of industries on the development and application of the OT that supports business activities, especially customers in the field of social and industrial infrastructure. Through these activities, Hitachi has acquired extensive know-how on understanding customer operations and identifying and resolving the real issues, and the ability to supply solutions that effectively combine OT with IT (see Figure 2).

The basis of this value creation is the urban service platform that is based on the Lumada IoT platform. This includes a "solution core" of templates for proven solutions in a variety of areas, making possible the rapid collaborative creation

of digital solutions to the challenges faced by customers. These templates cover energy, facilities, security, transportation demand analysis, transporting passengers and providing directions, and multi-modal services.

In providing urban solutions, Hitachi plans to operate its business not only in the Japanese market but also in North America, Europe, and the Asia-Pacific region encompassing Southeast Asia and China. This includes meeting the challenges of different regions by combining Hitachi products, services, and know-how that have built up a track record in past projects with solutions from domestic and overseas partners. Both in Japan and elsewhere, the goal is sustainable urban development and the provision of greater convenience and comfort.

For the spaces where people live, travel, work, relax, and find enjoyment, Hitachi intends to contribute to future urban development with a view to bringing about a "super smart society" by delivering value in the form of stress-free experiences made possible by the use of digital technology.