Featured Articles

Initiatives Aimed at Creating a Universal Design City for 2020

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OVERVIEW: "Implementation of Advanced Infrastructure Systems from Japan in 2020—Realizing a Dream that Originates from Japan," an FY2014 project of the Council on Competitiveness-Nippon with participation by 17 companies, put forward the UD city as a Japanese vision for overcoming such challenges as the extreme aging of the population and the increasing number of overseas visitors to Japan in the lead up to international sports events that are to be hosted by Tokyo[(1)]. The proposal included each company describing on its own behalf the challenges in the energy, mobility, security, and communication technology sectors that are best tackled through public-private collaboration. This article describes the "UD city," the particular approach to urban development that is based on the UD concept and is being undertaken by Kajima Corporation and Hitachi, and the outlook for the future.

INTRODUCTION

IN the lead up to an international sporting event to be hosted by Tokyo in 2020, preparations are being made for numerous redevelopment projects, upgrades to city infrastructure, and technology trials for advanced infrastructure systems such as automated transportation. Meanwhile, universal design (UD) is growing in importance as a core function of cities, including increasing the number of overseas visitors to Japan to 20 million (target for 2020), and dealing with the extreme aging of the population and with those most vulnerable to disasters.

Through the efforts of relevant government agencies and private companies, steady progress has been made on making public spaces and transportation barrier-free and incorporating UD into different products, areas in which Japan is well-advanced by international standards. From the viewpoint of users, however, progress remains patchy and unevenly distributed. This is believed to be due to its limited and transient nature because work on UD for infrastructure, products, and services has been undertaken in a piecemeal way and has had to be established in a standalone manner in terms of the business model it follows. Other inadequacies include lack of public understanding of the elderly or disabled, and poor awareness of the mutual and cooperative assistance by city residents needed to fill the gaps in infrastructure and other technology.

The 2020 sporting event is an excellent opportunity to overcome the challenge of making progress on UD from the user's perspective because of growing interest by the public as large numbers of stakeholders work together to achieve their shared objective of making the 2020 event a success.

While the concept encompasses all aspects of people's lives in cities, the proposal focuses on mobility, a subject that is deeply intertwined with the quality of life of the elderly and the disabled.

FROM THE BEGINNINGS OF BARRIER-FREE ACCESS TO THE ORIGIN OF THE UD CITY

An international sporting event hosted by Tokyo in 1964 was one of the starting points in Japan for thinking about autonomy and barrier-free access for the disabled. The same event, which is to be hosted by Tokyo again in 2020, presents a business opportunity for marketing advanced Japanese infrastructure systems to the world, in the form of a vision for mature cities in which the extreme aging of the population has become well-established.

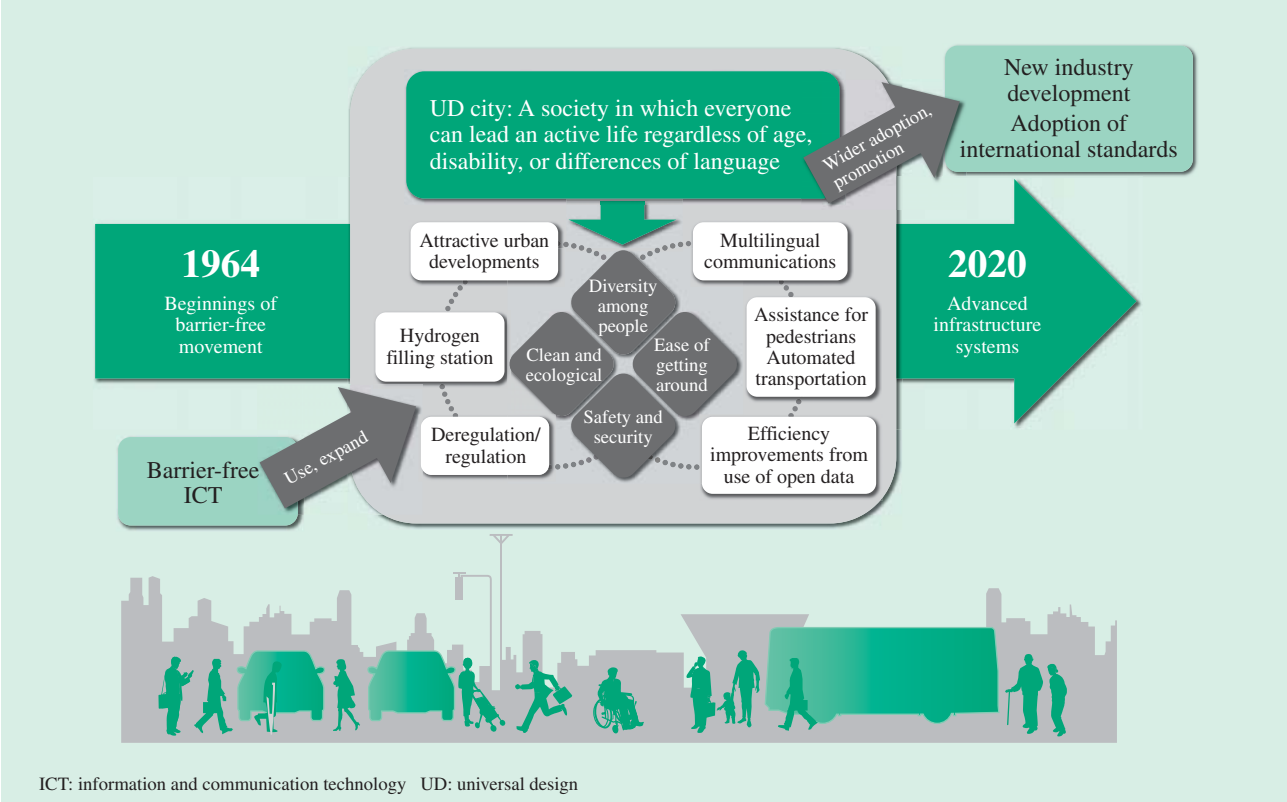

Fig. 1—Creation of UD City by Building Advanced Infrastructure Systems.
Demonstration project for trialing advanced systems for infrastructure such as energy, mobility, security, and communications are planned in the lead up to 2020. The UD city aims to tie these together from the user's perspective.

What is a UD City?

The concept behind a "UD city" is that it is a place in which everyone can live an active life regardless of age, disability, or differences of language. While the UD city represents a new vision for the cities of the future, much like an eco-city or smart city, it differs in envisaging the infrastructure, products, and services that make up a city in terms of user needs. The vision of everyone being able to appreciate the benefits of innovation to the greatest extent possible carries with it the potential for the creation of new industries (see Fig. 1).

Extreme Aging Populations and UD Cities

As Japan leads the world in the trend toward the extreme aging of the population, creating a society in which it is easy for the elderly to live is a pressing concern. For the elderly, being able to walk around, for example, is not only a means of getting from place to place, it is also a basic requirement for maintaining their quality of life. This means that reducing barriers and making places easily accessible by pedestrians, and expanding the scope of activity through measures such as physical assistance or personal mobility, are effective policies for making the elderly more active and extending their healthy life while also revitalizing the local economy.

ICT Platforms Needed for UD Cities

For example, pictograms (graphic symbols indicating things like toilet facilities or event venues) were used during the sporting event referred to earlier that was hosted in 1964 to make Japan an easier place to get around for overseas visitors of many different nationalities. Similarly, plans for the lead up to 2020 include providing advanced information and communication technology (ICT) such as multilingual digital signage as part of the city's tourism infrastructure. However, because it is impractical to serve the diverse needs of visitors with a single service, it is essential that these be coordinated and augmented based on the preferences and other characteristics of users. Providing seamless coordination of services from a user's perspective requires ICT platforms for the joint management and use of shared information. Examples include coordination of transportation information across different mobility services and joint management of personal information by businesses and users.

OVERVIEW OF UD CITY CONCEPT —FOCUSING ON MOBILITY—

This section considers how to deal with mobility, something that is recognized as both effective and of the utmost importance for such people as society's elderly and overseas visitors to Japan, and makes the following proposals.

Creating an Environment in which Everyone Can Move Around Freely and Will Want to Do So

(1) Mobility support technology and social practices that integrate goods and infrastructure

Easy and stress-free mobility not only helps individuals become more active and improves their quality of life in terms of health and other factors, it also promotes local economic activity and brings neighborhoods to life. What is needed are attractive urban developments in which everyone, including the elderly, disabled, and foreigners, can choose the means of getting around that best suit their physical capacities and other needs, and that encourage people to be mobile.

(2) Expansion of UD-related industry ("Silver New Deal")

The extreme aging of the population calls for infrastructure systems that enable everyone, including the elderly, disabled, and foreigners, to live active lives and make full use of their capabilities. This involves incorporating advanced Japanese technologies into these infrastructure systems and having them evolve with well-balanced assistance from hardware and software—including their integration into the environment and services, rather than just machinery on its own—and with the involvement of people. As the market for products and services that suit the lifestyle needs of such users is extremely large, an expansion in UD-related industries is anticipated[(2)].

Challenges

To achieve the objectives described above, the following two challenges need to be overcome.

(1) Treating products, services, and infrastructure as a combined package

Rather than deploying products, services, and infrastructure individually, they need to be provided as

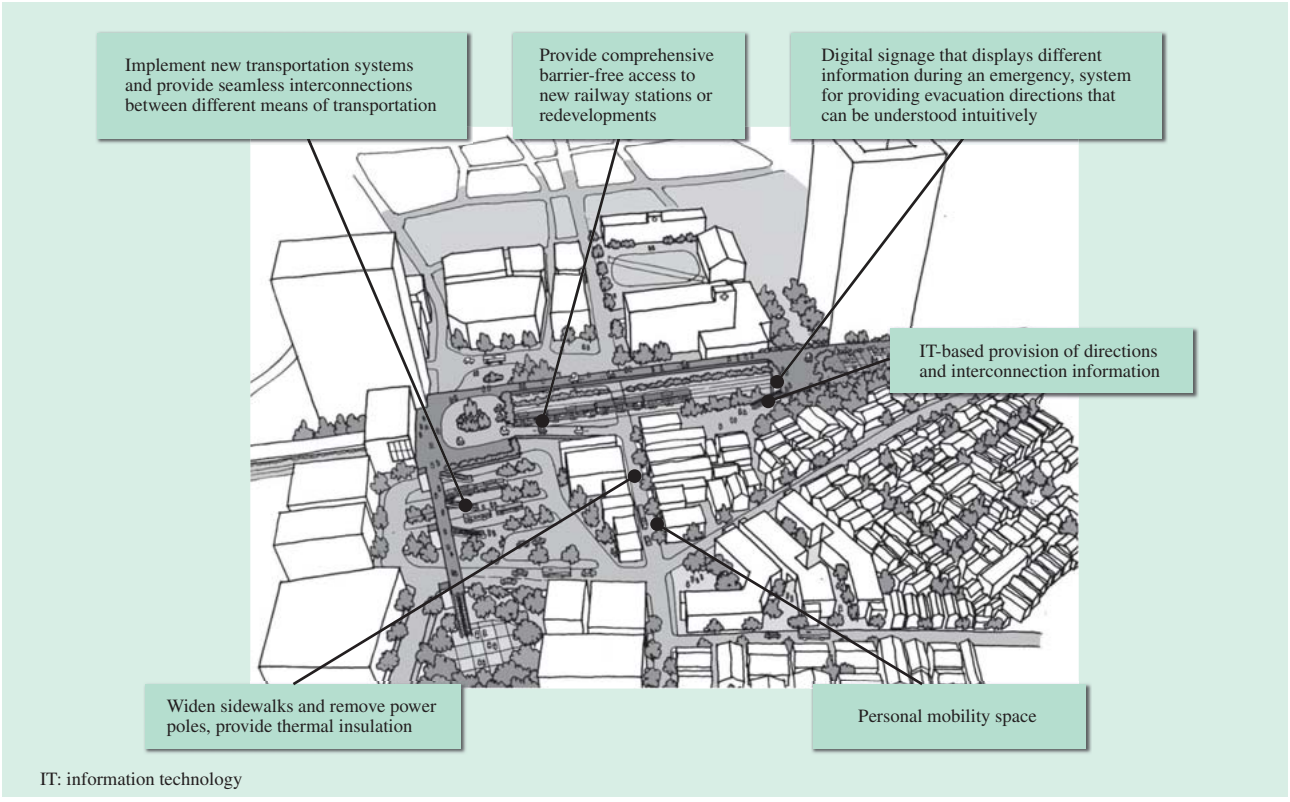

Fig. 2—Unified Execution of UD Implementation Projects for Urban Development.
UD technologies are first combined into packages through demonstration projects that include implementing new transportation systems or providing barrier-free access to sports venues, major transportation routes, and new railway stations, then deployed throughout the city.

a package in order to take advantage of synergies and make them more efficient. Personal forms of mobility with designs that encourage use, transportation and disaster information customized for individuals, and thoroughfares that can be shared by pedestrians, bicycles, electric mobility scooters, and other vehicles are examples of packages that support various different forms of mobility. Furthermore, making neighborhoods more attractive (such as being more lively and convenient) is an essential prerequisite for encouraging this sort of mobility.

(2) Pressing ahead with UD cities as a form of Social Innovation

There is a need for measures that cover numerous stakeholders in order to provide services that appear seamless to users, with a prerequisite being that Social Innovations include the development of new business models through collaborative creation.

Five Policies to Facilitate Implementation

The following five policies have been proposed for making the UD city a reality in the lead up to 2020.

Execution and Packaging of Public-Private UD Implementation Projects in Key Parts of the City

UD implementation projects that include the provision of major transportation routes and venues for large sporting events, new railway stations, and redevelopment involve new transportation systems as well as pressing ahead with the comprehensive provision of barrier-free access. Effective technology packages initially established through demonstration projects will subsequently be adopted throughout the city (see Fig. 2).

Creation of Attractive Pedestrian-oriented Thoroughfares that Invite Use of Diverse Forms of Mobility

To provide places where people can get around easily, whether it be on foot or using an electric mobility scooter or other vehicle, thoroughfares will be created that include infrastructure such as thermal insulation and are also free of obstacles such as power poles. The previously unused measure of selectively raising up parts of the road will be adopted for differences in level between roads and sidewalks. Places will be created where bicycles and personal mobility vehicles

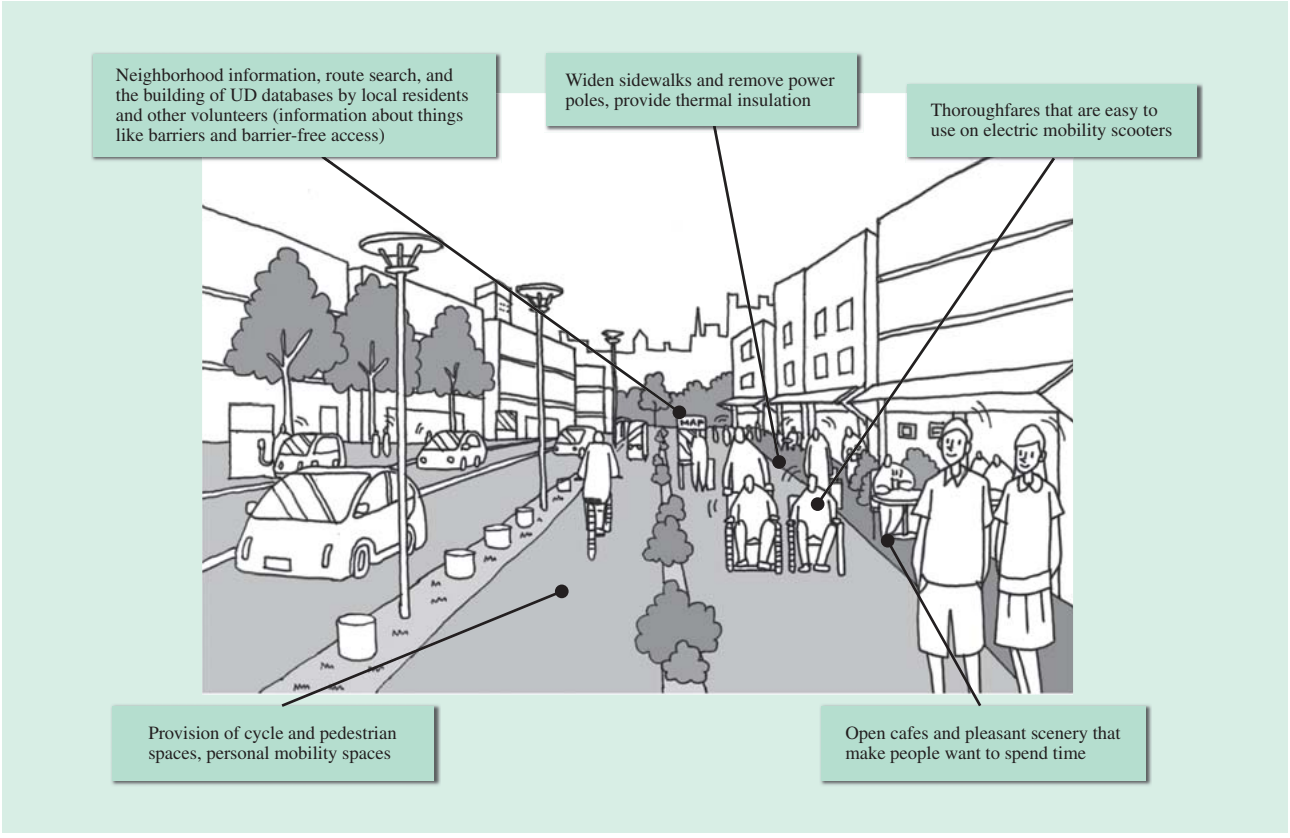

Fig. 3—Attractive Pedestrian-oriented Thoroughfares Suitable for Use by Diverse Forms of Mobility.
The provision of thoroughfares where people can get around on foot or can share with electric mobility scooters, bicycles, and other vehicles is an important aspect of the UD city. As well as being functional, these need to be attractive enough to encourage people to get out and about.

can be ridden safely, together with infrastructure for enabling seamless interconnections between different forms of transportation (such as bus stops or the plazas outside railway stations) (see Fig. 3).

Industry-Government-Academia Partnerships for Creating Market-Responsive Goods and Services to Achieve World-leading UD

This involves improving convenience and encouraging wider adoption by using such advanced technologies as artificial intelligence (AI) and robotics, and by producing attractive designs that utilize ways of creating market-responsive goods and services that allow for public participation.

Products and solutions suitable for the wider world will be made possible through collaborative creation with numerous stakeholders using techniques such as design thinking and inclusive design.

Achieving Viability for Construction and Operation of Transportation, Event, and Disaster Information Systems that Satisfy Diverse User Needs

This means enabling the provision of extensive information to the elderly, disabled, and foreigners to help them move around by having local residents and other volunteers create resident databases (DBs) of information about things like barriers and barrier-free access for small communities, and then combining these DBs. The information to be included in these DBs will be updated not only with detailed figures and photographs, but also information that is closely associated with daily life, such as three-dimensional information, frequency of use, and recommendations, and it will have interfaces that allow it to be accessed in a variety of different ways, including multilingual support.

Composition of Government-led "Centralizing Functions" that Execute UD-derived Projects in an Integrated Manner

The creation of a UD city is a complex policy challenge that covers a variety of sectors, and it requires the government to coordinate beyond its own specialist areas and proceed in a comprehensive and unified manner. Achieving this demands one-stop "centralizing functions" for formulating and implementing comprehensive policies. These functions integrate and standardize knowledge about UD, and are also needed when extending activities nationwide or overseas.

INITIATIVES AIMED AT IMPLEMENTATION

Putting the above proposals into practice will require collaborative creation through collaboration between the public and private sectors.

Integrated Supply of Infrastructure, Products, and Services by Combining UD Technologies from Different Companies

To date, the UD of infrastructure and products has been undertaken by individual companies working alone. Experience with UD at Kajima Corporation, for example, includes firefighting equipment (water screens) that enable the safe evacuation of people from a building during a fire regardless of their age or physical capabilities, and spatial designs for lighting, sound, and the appearance of floor coverings that appeal to the senses. The company has also adopted techniques for using simulation to evaluate these prior to use[3].

Hitachi also has experience using UD for products such as home appliances, elevators, and rolling stock, and it has utilized the experience design methodology for optimizing designs in terms of how user experiences vary over the course of service delivery[4), (5)].

Various other companies have applied UD to a wide range of products, including vehicles, ICT equipment, and home appliances.

The UD city proposal represents an approach that maximizes urban values from the user's perspective by consolidating the UD practices of these companies to supply infrastructure, products, and services as an integrated package.

UD Trends

A wide range of policies are under consideration as potential UD initiatives. These include the "Basic Plan on Transport Policy" being coordinated by the Ministry of Land, Infrastructure, Transport and Tourism, Automated Driving System that helps the elderly and others get around (the Cabinet Office's Cross-ministerial Strategic Innovation Promotion Program), the "Study into How to Provide Information and Barrier-free Access for Evacuation Routes, etc. for Disasters and Emergencies" of the Ministry of Land, Infrastructure, Transport and Tourism, and the provision of infrastructure for overseas visitors and others (payment by credit card: Ministry of Economy, Trade and Industry, multilingual translation system: Ministry of Internal Affairs and Communications). In Tokyo, meanwhile, numerous local bodies have formulated policies for providing things like barrier-free access and UD (with a plan for welfare urban development as one example), including a committee to study comprehensive transportation policies for Tokyo.

A recent development has been an increase in UD-related activities in anticipation of the international sporting events to be hosted by Tokyo, including the Tokyo Universal Design Showcase[6] announced in May 2015 by the Industrial Competitiveness Council, and an economics conference on the Olympic and Paralympic Games and other events held by the Japan Business Federation (Keidanren).

Achieving Collaborative Creation with a View to the Long Term

Creating a UD city requires ongoing activities that go beyond the bounds of "welfare" and are based on an awareness of how it relates to things like improving social vitality and industrial competitiveness. However, benefits are slow to appear in the short term and only come about through ongoing work. What is needed is for companies to act on their own initiative in cognizance of these long-term benefits and in step with the national and local government developments described above, and, against this background, to establish a virtuous circle in which the adoption of more active policies by the public sector creates an environment that encourages action by the private sector (see Fig. 4).

A feature of the proposal by the Council on Competitiveness-Nippon (COCN) is that it involves companies themselves engaging in ongoing activities aimed at achieving the objective. The proposal also involved the establishment of a UD city steering committee in October 2015 by a number of companies to look at how to realize the concepts described in this article. This was a spin-off activity of the FY2014 project. It is anticipated that activities like this will help make the UD city a reality by coordinating with other initiatives such as public-private technology trials or policies for raising awareness among city residents.

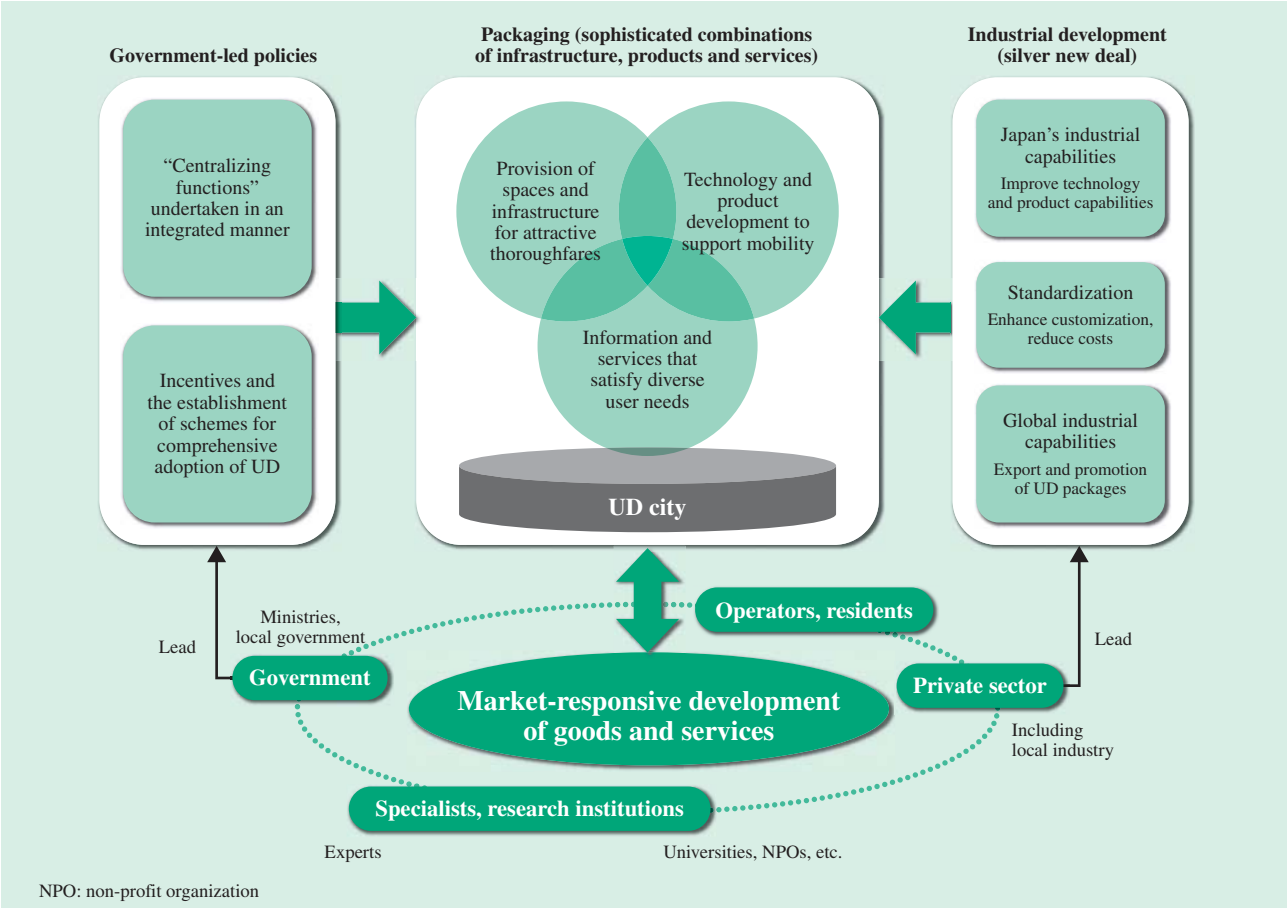

Fig. 4—Overview of Activities Aimed at Creating UD Cities.
What is needed is for companies to act on their own initiative in step with national and local government developments, and, against this background, to establish a virtuous circle in which the adoption of more active policies by the public sector makes it easier for the private sector to take up new challenges. By adopting an approach based on user participation, opinions are incorporated from the early stages.

CONCLUSIONS

Considered in terms of the technologies used to achieve it, the UD city is not significantly different from the existing idea of a smart city. Nevertheless, it represents a new approach in that it involves user-inspired urban and product development whereby services and infrastructure are optimized in terms of the perspectives and needs of users, while also raising awareness of UD among city residents. Achieving this is recognized as a major challenge targeting the market-responsive production of goods and services through collaborative creation with the many stakeholders and participation by those involved, and thereby fosters a sense of complementarity and mutual assistance among city residents.

Just as the international sporting event held in Tokyo in 1964 was one of the factors in kicking off the barrier-free movement in Japan, letting the world know that holding the same event again in 2020 will be the starting point for creating UD cities should lead both to a renewal of understanding among the Japanese population, and to the international promotion of a vision for cities where the aging of the population is well-advanced by the country that will be the first to experience such a situation, namely Japan.

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