Section 2
LEVERAGING DX IN KANSAI AND OSAKA

SHIMOJO, Shinji; ASHIKAGA, Tomoyoshi

1. Two types of economic effects of DX

With the adoption of the "Osaka Super City Concept" as a super city-type national strategic special zone by the Cabinet Office in April 2022, the "Osaka Prefecture Super City Concept" has begun to move toward the social implementation of a data collaboration infrastructure (ORDEN) known as an urban operating system (OS). A super city is an effort to promote sustainable urban development at a higher level than before by utilizing DX, and an urban OS is a digital platform for a super city that efficiently manages the entire city by utilizing sensors, networks, big data, artificial intelligence (AI), etc. (Figure 5-2-1). The Osaka Prefecture Super City Concept has two green fields, Yumeshima (Yumeshima Construction, Osaka-Kansai Expo) and Umekita Phase 2, where rapid demonstration and social implementation of cutting-edge services is being promoted by taking advantage of the nature of green fields, where urban development is conducted from the ground up.

   This section analyzes the effects of applying DX in a super city based on the definition in the Cabinet Office's "Smart City Guidebook": "Smart cities solve various problems faced by cities and regions, and continue to create new value." The "solution of various problems" refers to the streamlining of existing businesses through data visualization and analysis and is an aspect of "quantitative
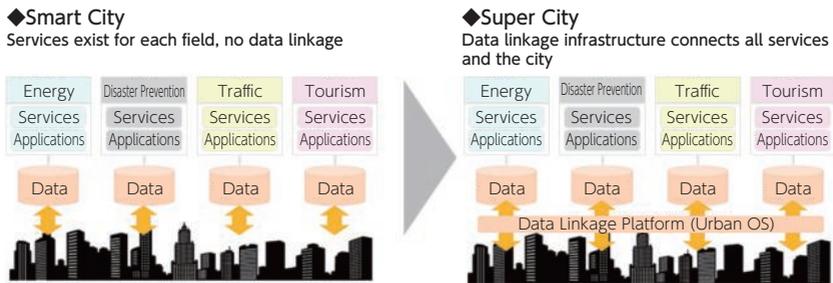

◆Smart City
Services exist for each field, no data linkage

◆Super City
Data linkage infrastructure connects all services and the city

Energy	Disaster Prevention	Traffic	Tourism
Services	Services	Services	Services
Applications	Applications	Applications	Applications
Data	Data	Data	Data

Energy	Disaster Prevention	Traffic	Tourism
Services	Services	Services	Services
Applications	Applications	Applications	Applications
Data	Data	Data	Data

Data Linkage Platform (Urban OS)

Figure 5-2-1   Difference between Smart Cities and Super Cities

Source: IoT News, "What is the 'Super City' Concept of Urban DX?" Source: IoT News, "What is the 'Super City' Concept?"

improvement effects." "Creating value" refers to new value and new business created from data and is an aspect of "qualitative business transformation."

In the following, we will introduce two aspects of service cases using DX: "quantitative improvement effects" and "qualitative business transformation."[1]

2. Quantitative improvement effects

Here, we introduce two cases in which data analysis and visualization were incorporated into existing businesses to improve process efficiency. The first is the case of Mitsubishi UFJ Trust and Banking Corporation, which used the information banking service "Dprime" to integrate user communication into a company's product development process, and developed a final product based on the results of collecting and analyzing personal data and questionnaire data. The second is a case study of "Yumeshima Construction," a project to use DX to facilitate the construction of the Expo site and related infrastructure for the 2025 Osaka-Kansai Expo, including countermeasures against traffic congestion of construction vehicles and smooth movement of workers.

(1) Product development based on analysis of users' personal data

In July 2022, Mitsubishi UFJ Trust and Banking Corporation launched the "Beer Development Project with Your Data and Waste Ingredients" based on the concept of "Let's Make Beer Together to Raise Food Loss Issues." Users experience the process of creating products using their own data, and companies develop products from the user's perspective while sharing the social significance of the product and gaining the empathy of the user. This is a service that can only be provided by an information bank that connects individuals and companies with data.

In this project, participants were recruited through the "Dprime" application, and a pilot version was developed by the company through in-depth analysis of personal data and questionnaire data for 1,400 participants. Since feedback to participants must be simple to gain their sympathy and be seen by them, the results of the analysis for participants were presented in an easy-to-understand graphical format with four cut-off points, according to the data on beer tastes and preferences. For example, for those who do not like beer, we created a slightly sweet and fruity one that does not show bitterness from the viewpoint of user comprehensibility. For other analyses, we decided on a case-by-case

---

1) The case studies are taken from the Asia Pacific Institute of Research's "Urban DX in Kansai and Osaka" study group report (FY2022).

basis how to communicate with the participants and published the results on our website and in videos to make it easier for them to understand how to use the data. The beer development process was conducted by actually making four kinds of beer, having 600 people drink a set of the four kinds, and collecting questionnaires afterward.

The "food loss countermeasure" in the development of this beer was the use of grapefruits that were to be discarded by farmers and cacao husks (cacao peels discarded during chocolate processing). The grapefruit was produced in cooperation with a company called "Midori-no-Sato Ryokun" in Miyazaki Prefecture, and the cacao husk was produced in cooperation with "Dandelion Chocolate." By communicating the concerns and thoughts of these partner companies on food loss issues through videos and websites, the project has gained the sympathy of users not only for the brewing of beer, but also for efforts to address social issues.

In the questionnaire results before the tasting, few people answered that they would "actively choose products that solve social issues," with 24% saying that they would "actively want to choose," but in the questionnaire results after the tasting, those who changed their attitude to "actively want to choose" increased by 26% to 50%, indicating the "achievement of empathy," which was the significance of the project.

The use of "Dprime" in this product development project not only enabled the construction of customer contact points by disclosing the development process, but also enabled the sequential reflection of massive data obtained from users in product development, as well as the acquisition of empathy from users.

(2) Yumeshima Construction

A large number of construction vehicles are expected to come to Yumeshima during the large-scale construction of the Osaka-Kansai Expo. In addition to construction vehicles, container trucks and general vehicles are also expected to travel on Yumeshima, potentially causing large-scale traffic congestion. There are two major routes to Yumeshima, one from Maishima in the north and the other from Sakishima in the south. Even if these two routes flow smoothly, there is a gate to the construction site on the route, and delays near this gate will lead to congestion. Even if the gate can be passed, there is a limit to the number of parking spaces available due to the limited area of the Expo construction site, and these factors must be considered (Figure 5-2-2).

However, while the number of construction vehicles must be planned so as not to cause traffic congestion, the plan should not be adjusted on a monthly basis. In addition, the Osaka-Kansai Expo project involves coordination among

Figure 5–2–2   Access route to Yumeshima

Source: Osaka Super City Council, "Osaka Super City Overall Plan," p.24; figure processed by APIR.

multiple construction companies, resulting in an enormous amount of coordination man-hours. In order to reduce the coordination man-hours, we use "DX at construction sites" that utilizes mathematical optimization.

In the past, for example, data for each construction area was managed individually by the company managing the construction area, but Yumeshima Construction's "Data Standardization and Visualization System" centralizes the vehicle management data held by each construction company and displays it on a dashboard for a one-stop view of the data.

Specifically, in order to estimate the adjusted number of construction vehicles in the operation plan, the total number of vehicles in the operation plan for each north-south route is calculated. The number of general vehicles is also estimated based on historical traffic volume data, and the sum of the number of vehicles on each route is calculated. This sum is then used to determine the number of vehicles that exceed the upper traffic limit for each route using traffic engineering. In addition, the conditions required for the planning include the vehicle adjustment conditions from each general contractor and weather information data necessary for making decisions when adjusting the vehicles. For example, ready-mixed concrete trucks cannot work if they are brought in on a rainy day, so if it is known that it will rain tomorrow, it is necessary to shift these trucks to the day before or the day after, or to a time when it will not rain.

The Yumeshima Construction dashboard displays a revised operation plan for construction vehicles based on mathematical optimization with the objective

function of minimizing the number of adjustment man-hours and the time spent traveling before and after adjustment. Although this is a hypothetical simulation, it is estimated that the system will reduce the number of man-hours required to adjust construction vehicles by about 420 hours per month, assuming that there are about 300 vehicles per day and that each vehicle takes 2 minutes to adjust (Figure 5-2-3).

3. Qualitative business transformation

Here, we present the Pasona Metaverse from Pasona Inc., a company that is working to create new industries, jobs and career opportunities in rural areas using virtual spaces (metaverse).

In September 2020, Pasona relocated part of its head office functions to Awaji Island. The relocation of a portion of Pasona's head office functions is not only from a BCP perspective, but also from the perspective of the decline of rural areas and agriculture, the falling birthrate and aging population, children on waiting lists, the separation of employees from nursing care, and the physical
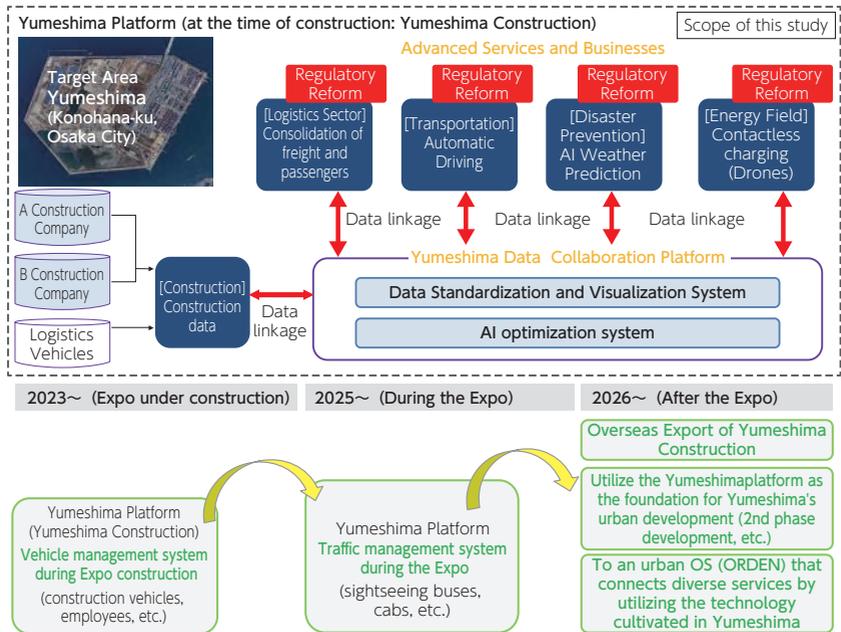

Figure 5-2-3　Yumeshima Construction's System Configuration

Source: Super City Smart City Forum 2022 Lecture "Kankeiren's Approach to Yumeshima City Planning Starting with 'Yumeshima Construction,'" p.21.

The World to Date (Web 2.0)	The World of the Future (Web 3.0)
Formed by platforms centered on giant corporations	Formed by autonomous, mutually supportive communities
Matching people to jobs Employment and services	Value-creating, exchange, mutual aid decentralized self-supporting organization

Pasona Metaverse's Three Initiatives for a Web 3.0 World

Formation of 100 communities (towns)

Initiatives for Commercialization
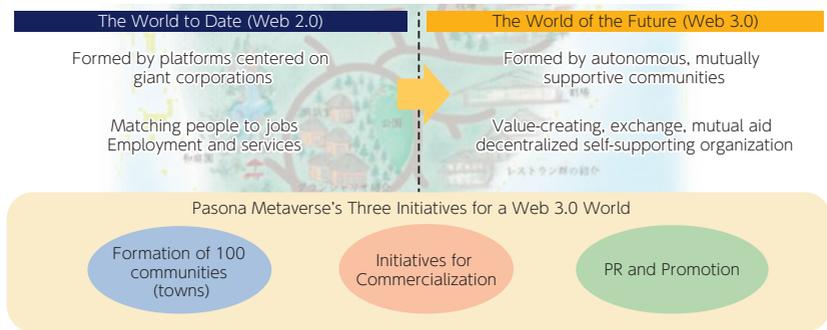
PR and Promotion

Figure 5-2-4 Pasona Metaverse Initiatives

Source: "FY2022 SDGs Public-Private Partnerships for Local Development: Excellent Examples of Efforts," p.14, International Forum on SDGs for Local Development 2023

and mental environment, as well as the value of the option to end Tokyo's concentration. Awaji Island is about the same size as the 23 wards of Tokyo or Singapore, with a population of 120,000.

Pasona aims to create new industries, employment and career opportunities by multiplying Awaji Island activities with the Metaverse. In order to create work opportunities and business operations in the metaverse, Pasona has created a new community industry with "100 communities (towns)" and presented the working environment, facilities and values on Awaji Island (Figure 5-2-4).

The community allows users to participate in real content on Awaji Island, and when there is a "shortage of people or poor response from facilities," a mechanism is in place to send customers to each other. When using a car, one would conventionally go to Awaji Island and then car-share, or rent a car in Shin-Kobe or Sannomiya, but in Pasona's metaverse, one owns their own car in the metaverse space before going to Awaji Island, and when one arrives, they can get into their own car in the virtual space in real time.

Pasona has launched the Avatar Human Resource Creation Project and created the Awaji Avatar Center on Awaji Island. The center provides opportunities for staff who want to serve customers to work in sales and reception. For example, there is a theme park called "Nijigen-no-mori" on Awaji Island, which has a large digital signage display at the entrance that shows video clips. When you say "Hello" in front of this display, a staff member at the Avatar Center answers your question. The avatars do not have faces, and voice conversion is also possible, so that a person of a different age or gender can serve customers as if she were a woman in her 20s without any discomfort. The avatar concierge can be connected to the chatbot on the Web. For example, if the system is installed

in a store that is closed at night, it can respond via the Web from Awaji Island because the number of customers is not known even if the store is open at night. The system can also be used for event reception, to find new customers, and to utilize specialized human resources. In the field of digital marketing, placing avatar consultants on the Internet has the effect of increasing conversion rates and inquiries. Currently, the Avatar Center on Awaji Island handles this service, but in the future, we are considering offering this service at home. This method allows a wide range of skilled personnel to be utilized throughout the country, such as by making it possible to respond from a different location if one location becomes congested.

4. How a super city (urban DX) should be

In order for the development plan of the "Osaka Super City Concept" to ensure the sustainable development of the city in the future, it is necessary to provide services that solve the problems of consumers and visitors and improve their quality of life (QoL), and to maintain their level of satisfaction.

The fact that a city continuously enhances and evolves the attractiveness of its services to its residents and users has something in common with the subscription-based business model: Tzuo (2018) describes subscription from the perspective of the service provider as "focusing on the needs of specific customer desires and creating services that bring continuous value to them. If this subscription approach is applied to cities, "a state of high QoL" can be realized by analyzing the inconveniences (who is troubled and why) latent in the city and providing services to satisfy those inconveniences.

There are two ways to increase the value of a service to a customer in subscription: up-selling and cross-selling. Up-selling is proposal of a new service that brings new value to the current situation. Cross-selling is creating new value by linking with other services.

In order to sustainably improve the quality of services, optimizing services for individual users (personalization) using user response and evaluation data will strengthen the residents' intention to continue living in the community. In addition, new services must be created through up-selling and cross-selling to increase the value to customers. The three case studies presented in this report have in common that they have both real and virtual user contact points and continue to generate high QoL through data-driven service provision, which provides suggestions on how to gain community engagement.

It will become increasingly important for Osaka Prefecture and Super Cities to continue to increase and retain residents by enhancing their services, in an

Part I

Part II

Part III

Part IV

environment where cities around the world are competing for population.

References

Asia Pacific Institute of Research, "Comprehensive digital transformation in Kansai and Osaka," Report of the Research Project (FY 2022)
https://www.apir.or.jp/research/11175/

International Forum on SDGs for Regional Revitalization 2023 "Introduction of Excellent cases of Public-Private Partnerships for SDGs in FY 2022"
https://future-city.go.jp/sdgs-event/assets/pdf/2023/20230207_1700_awaji_jp.pdf

Osaka Super City Council, "Osaka Super City Overall Plan."
https://www.pref.osaka.lg.jp/attach/22971/00428630/01_zentaikeikaku.pdf

Super City Smart City Forum 2022, "Kansai Economic Federation's Approach to Yumeshima City Planning Starting with 'Yumeshima Construction'" (in Japanese).
https://www.chisou.go.jp/tiiki/kokusentoc/supercity/supercityforum2022/Forum2022_3-10.pdf