A Blueprint for Smart Cities from Japan

— From a Frontier of Challenges to the Growth Economies —

Matrix of Cyber Smart City Consortium (MCSCC)

Yoshihisa Toyosaki, Representative Director and Smart City Architect

Revised Edition, October 2026

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This revised edition adds quantitative evidence drawn from Japanese national project reports issued by the Ministry of Land, Infrastructure, Transport and Tourism, the Agency for Natural Resources and Energy, the Cabinet Office, and other bodies. It also refines the descriptions of project implementation structures and flight formats against the primary sources. Figures are identified as measured values, estimates, targets, or external statistics.

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Introduction — What Is MCSCC?

The Matrix of Cyber Smart City Consortium (MCSCC), founded in 2018, is an implementation-focused smart city consortium bringing together industry, government, and academia. In May 2019, its proposal was selected as one of fifteen "Leading Model Projects"

under the Smart City Model Program of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), with Masuda City as the testbed. The program recognized it as a national model initiative aimed at realizing a cyber-physical-system society through IoT across the environment, disaster prevention, wellness, and social infrastructure.

MCSCC is an implementation-focused smart city consortium that proves concepts in the local communities of Japan — a country at the frontier of societal challenges — and implements them in the growth economies of Asia and Europe.

Japan's regions are at the global forefront of challenges: super-aging, rising medical costs, population decline and depopulation, and aging infrastructure. MCSCC treats this "head start in challenges" as an asset. A solution proven where the challenge is sharpest can be exported to the growth economies of Asia and Europe that will face the same challenge next. Proof of concept happens in Japan; implementation happens worldwide. That is MCSCC's basic structure.

Our approach has three hallmarks. First, **R (research) before D (development)**: we begin from field investigation, not from technology. Second, a **human-centered, problem-solving orientation**. Third, we design the city as **an architecture built on semiconductors** — sensors, networks, data platforms, and the brain (AI) treated as one system.

This book follows a single geographic and historical axis: **Masuda → Nagasaki → Indonesia**. The Masuda project was never designed to end as a demonstration in a Japanese provincial city. From the outset, it was designed to create transferable "patterns" of solutions for emerging economies that will face the same challenges. Nagasaki is the node that carries those patterns to the world. It is not merely the next step in domestic expansion. Starting from a city historically connected, through Dejima, to Batavia (present-day Jakarta), MCSCC's design reconnects historical ties with Indonesia and Vietnam as present-day **international city partnerships**. Indonesia is the principal field in which those patterns are implemented, and a foothold for expansion into Vietnam and beyond. The chapters of this book are intended to be read along this axis.

Beyond that axis, MCSCC positions two international hubs. **Indonesia is the Asian Hub, and Bulgaria is the EU Hub.** In Indonesia, we cultivate urban implementation and the circulation of people and industry; Bulgaria serves as the gateway to European policy, industry, and academia. In the future, we will design the integration of the two hubs as a single network through which knowledge, technology, and people circulate between Asia and Europe. This is MCSCC's grand vision and strategy.

Chapter 1. The Design Philosophy: The Smart City as a Future Data Industry

At the core of MCSCC's philosophy, a smart city is defined as **the embodiment of a cyber-physical system (CPS)**. A city is a "layer" that generates vast amounts of data — on health, mobility, infrastructure, and energy — and a smart city is the circulation that collects that data, processes it, and feeds it back into how the city runs. We call this the **future data industry**.

The system is layered:

1. **The edge layer** — wearable devices, environmental sensors, drones, and vehicles: the entry points that generate and collect data.
2. **The nervous layer** — fiber-optic networks, LPWA, 5G, and data-linkage platforms such as a city OS.
3. **The brain layer (the "cyber brain" / urban brain)** — AI data centers, implemented inside the city, which process the collected data and return decisions. This is where semiconductors are consumed in massive volumes.
4. **The limbs layer** — robots and humanoids (physical AI), which execute the brain's decisions in the physical world.
5. **The space layer** — positioning satellites and low-earth-orbit constellations, which support the city's nervous system from orbit where terrestrial networks cannot reach — or when disaster takes them down.

The space layer is not merely a concept; it has a track record of demonstrations. Building on space radio technology developed by JAXA and Advanced RF Design, from 2017 we conducted ground evaluations of "Hyper LPWA" — five times the RF output of standard LoRa, theoretically linking about 20 km — and designed applications such as marine smart buoys collecting water-temperature data. For positioning, we adopted Japan's Quasi-Zenith Satellite System (Michibiki / QZSS) for road patrols in Masuda, and confirmed in actual driving that a satellite always near the zenith keeps vehicle tracks obtainable in mountain terrain where GPS alone loses signal. Looking ahead, we envision a world in which city terminals connect directly with stations in space, reducing dependence on ground infrastructure. The smart city on the ground and communication/data infrastructure in space are linked within a single blueprint.

This brain is not a new word for MCSCC. From 2018, we adopted FIWARE — the open-source IoT platform developed under Europe's FI-PPP program — and ran early proofs of concept as "the MCSCC FIWARE, foundation of the Cyber City Brain": a cross-domain design collecting data across fields through standardized open APIs (NGSI), a secure IoT server that processes data while encrypted, and a concept that extended to data-center siting in Nagasaki City and Minato, Tokyo — the district associated with Dejima. Server

implementation also proceeded in the context of the MLIT Leading Model Project. The prototype of what we now call the cyber brain (urban brain) stands here.

This framing explains the recent explosion in demand for AI semiconductors. The rush to build AI data centers is a phenomenon in which the smart city's brain layer has grown large ahead of the city itself. The edge layer rises slowly, at the pace of local implementation. The brain grows first; the body catches up. Designing the whole — with semiconductors as its foundation technology — is the work of the smart city.

MCSCC's fields of activity — semiconductor industrial strategy, health data from wearables, infrastructure inspection by drone, and urban implementation in Indonesia — are therefore not separate ventures. Each occupies one layer of a single blueprint.

The Design Flow: Masuda → Nagasaki → Asia

The blueprint also has a spatial flow. Patterns are born in Masuda. Although it is a mountainous city of about 45,000 people, Masuda already faces nearly the full set of challenges: super-aging, healthcare, wildlife damage, and aging infrastructure. It is a "laboratory of challenges." The patterns created there are not for domestic use only. They are stripped down, with future challenges in emerging economies in view, into forms that are inexpensive, maintainable, and operable by local personnel. Building prototypes designed for emerging economies — that is Masuda's role.

Patterns are connected to the world in Nagasaki. Nagasaki is both a microcosm of Japan's remote islands and one of the few Japanese cities that has been directly connected to the world, historically linked through Dejima to Batavia. As symbolized by the Indonesia Economy, Industry and Human Resources Symposium co-hosted by Nagasaki Prefecture and MCSCC in February 2026 at Dejima Messe Nagasaki, and by the letter from the Rebana Metropolitan Authority to the Governor of Nagasaki, Nagasaki serves as the node that reconnects historical ties as present-day international city partnerships. The drone and Island MaaS implementations in Nagasaki are also demonstrations of the technologies and people that gather at this node.

Patterns are then implemented in Asia. In Indonesia, implementation is advancing under agreements with local governments, national research institutions, universities, and local companies; in Vietnam, dialogue has begun through academic partnerships. Create in Masuda, connect in Nagasaki, implement in Asia. That flow is MCSCC's spatial design.

The endpoint of international expansion is not entry into a single region. MCSCC positions Indonesia as the Asian Hub and Bulgaria as the EU Hub. At the Asian Hub, sites of urban implementation and growth markets take shape; at the EU Hub, networks of policy, academia, and industry are formed. By integrating the two hubs in the future, patterns born in Masuda will be tested and improved in both Asia and Europe, and will flow back to Japan and the world. Rather than connecting regions as points, we connect hub to hub to create a

surface. This is MCSCC's vision for raising international city partnerships into an industrial strategy.

Spatially, this blueprint converges on a single idea: **the fusion of metropolitan and rural**. Challenges sharpen first in the countryside, while capital and the brain accumulate in the metropolis. Left alone, that asymmetry lets the countryside decline and leaves the city unprepared for its own future challenges. MCSCC's method runs the other way. The rural community is the proving ground where the prototypes of solutions are born; the metropolitan region is the stage where those patterns are implemented at scale. The monitoring and disaster-prevention patterns born in Masuda connect to the urban design of the Rebana Metropolitan area, while the technology and capital raised in the cities' brain layer flow back to sustain implementation in the countryside. City and countryside are not opposites. They are organs of a single circulation of data, living at different speeds. A future digital society is, in the end, a society that has succeeded in designing this fusion.

Chapter 2. The Masuda Model: Proof of Concept in a Frontier Community (Masuda City, Shimane)

The prototype of MCSCC's methodology began in Masuda City, Shimane Prefecture, in 2016. It is worth stressing that this initiative was not designed to be completed as a "local demonstration." What is created in Masuda is not a system for Japan's regions alone. It is a transferable pattern that can be exported to emerging economies that will face the challenges of aging, medical costs, and infrastructure maintenance. Inexpensive to build, maintainable by local personnel, and capable of demonstrating effects in numbers — that is why the Masuda demonstrations insist on costs and quantitative data. Known as the **Masuda Model**, the initiative was selected on May 31, 2019 as one of the fifteen "Leading Model Projects" under the MLIT Smart City Model Program, and was adopted for three consecutive years, 2019–2021. The significance lies in a rural city standing among the fifteen chosen nationwide: alongside metropolitan demonstrations, the national selection affirmed MCSCC's claim that a challenge-frontier local city — not only a big city — can be the prototype of the smart city.

The method deserves note. Before services began, MCSCC delivered eleven education programs to the community over roughly two and a half years, free of charge, receiving nothing from the city — in other words, a private-sector R&D investment made ahead of any return. We did not begin with a sales pitch; we began by cultivating local understanding and people. That order determined the sustainability of everything that followed.

The foundation was a fiber-optic network reaching every household and LPWA (low-power wide-area) connectivity.

The first full-scale demonstration on that foundation was disaster prevention. The "Urban River Water-Level Monitoring IoT Water Gauge System" (July 2017 – February 2019) addressed the backflow and flooding of channels connected to the Takatsu River in Masuda: IoT modules combining OMRON absolute-pressure sensors with LoRa-based LPWA were installed at more than a dozen points, aggregating water levels to a server that analyzed flood potential. The project — Architect Grand Design, OMRON, Shimane Masuda Electronics, Keio University, and others — drew this evaluation from the city's responsible division: "Without going to the site, we can judge by numbers rather than by feel, and operate the sluice gates swiftly. Having it and not having it make an entirely different response." The system remained in operation by the city after the demonstration and received an award (recommended case) from the YRP R&D Promotion Association in 2018. For the communications base, a working group also examined implementing a self-operated LPWA network across all of Masuda, including NICT's disaster-resilient regional platform technologies (NerveNet and private LoRa).

On this foundation, services were implemented challenge by challenge: resident health management through blood-pressure-monitor monitoring (begun in workplaces in 2018, expanded to a scale of 1,000–2,000 citizens from 2019); and road monitoring by patrol cars carrying 31 sensors.

The monitoring of elderly residents with dementia who walk out alone began as a request from a frontline institution. At the request of the Masuda Police Station, a working group of MCSCC, the city's Elderly Welfare Division, and the police station was formed in April 2019, and carried out field verification of GPS tracking at four locations in the city, connecting search practice with technology. This history is also documented in MCSCC's FY2020 report to MLIT (p. 52), which records that "the demonstration originated in a request from the Masuda Police Station." The challenge was set not by proposing technology, but by answering a request from the front line — the police — a clear expression of our R-before-D methodology.

Masuda's proof of concept also grew into inter-city collaboration. From 2018, together with Yatsushiro City in Kumamoto Prefecture, MCSCC ran a "Smart Agriculture IoT (wildlife damage countermeasures)" project. According to statistics from the Ministry of Agriculture, Forestry and Fisheries, crop damage by wildlife totaled roughly ¥16.4 billion in FY2017 (external statistics), with deer, boar, and monkeys accounting for about 70 percent — while in mountain communities the people who carry out countermeasures are themselves aging away. MCSCC formed a Wildlife IoT Working Group (Architect Grand Design, Advanced RF Design, NEC Solution Innovators, Suematsu Electronics, National Institute of Technology, Kumamoto College, the City of Masuda, and others) and designed a labor-saving system combining electric fences with LPWA wireless. Following installation and guidance in Masuda's Shinmasa district, the MLIT demonstration reported that on the target field (30 ares), where wildlife damage in the previous year had reduced the harvest to about 30

percent of the undamaged level, proper maintenance supported by monitoring restored the crop to "almost no damage" (FY2020 report, p. 52). Alongside health, the farm field is another proving ground of the edge layer.

One more demonstration crosses the layers: Smart Forest Monitoring and Disaster Prevention. MCSCC formed a working group with the Takatsugawa Forestry Cooperative, consulted with Kokusai Kogyo on remote sensing, and installed "smart stakes" in Masuda's Mitsuboshi district, treating forest monitoring and disaster prevention as one problem. Combining observation from space (remote sensing), drones in the air, sensors on the ground, and the field knowledge of a forestry cooperative whose workforce is aging, the demonstration — carried out in the context of the MLIT Leading Model Project — was among Japan's earliest attempts at "space × disaster prevention × forest management." Mountains and forests are not scenery outside the city: they are water sources, the starting points of disasters, and carbon sinks. Extending the circulation of data to the deepest rural layer is a condition of the fusion we design.

The Masuda Model also taught a lesson about cost structure. Large-scale city OS introductions and operations are generally said to require enormous expense, and can easily become an excessive burden for a municipality with an annual budget of roughly ¥20 billion. MCSCC has raised this issue directly, including with Japan's first Minister for Digital Transformation. By contrast, the common platform built in the MLIT demonstration (a model with ten LPWA base stations) was estimated to cost only about ¥1.45–1.57 million initially and about ¥54,000–204,000 per year to run (FY2020 report; estimates; the common portion only, with terminals and applications separate). A smart city for a rural community cannot be a scaled-down copy of a metropolitan system; it must be designed for local finances and local people.

Quantitative Evidence (Chapter 2: Selected Examples)

The principal figures from the reports to MLIT are as follows, with the type of each figure identified.

- **LPWA range (Measured):** A very-low-power LPWA transmitter reached 200–300 m in an urban area at 2 mW output, and about 1 km at 20 mW output (FY2019 supplementary report, pp. 24, 28).
- **Battery life of the monitoring transmitter (specification based on measurement):** About 100 days for a model terminal alternating between 2 mW and 20 mW output. The difference in operating burden is large compared with a GPS tracker that requires charging every few days (same report, p. 24).
- **Annual cost of elderly monitoring (Estimate):** About ¥693,000–783,000 per year for a configuration of twelve base stations and two mobile receiver sets (same report, Tables 5-5 and 5-6).

- **Cost of infant monitoring (Estimate):** About ¥2.41 million per year in total, or about ¥83,000 per nursery per year, for a model deploying two sensors at each of 29 nurseries in the city and sharing information with a medical institution (same report, Table 5-7).
- **Cost of the common platform (Estimate):** About ¥1.45–1.57 million initially and about ¥54,000–204,000 per year for a model with ten LPWA base stations. When two services were connected simultaneously, the server CPU load remained at only a few percent or less (Measured; FY2020 report, pp. 23, 48).
- **Smart stakes (Measured):** Position and tilt data were acquired every 30 minutes for about two months without loss. Even at very low output (about 2 mW), data reception from a drone was confirmed at a straight-line distance of about 800 m — four times the 200 m evaluation criterion (same report, pp. 26, 30–31).
- **Road monitoring (Measured):** Diagnosis was fully automated, and a system was implemented that can grasp the degree of damage within 24 hours after a patrol (same report, Supplementary Material 5-4). The evaluation indicators conform to MLIT's pavement inspection guidelines.
- **Value created by electric fences (Estimate):** On the 30-are target field, harvest recovery of about ¥540,000 and reduced checking work (about 100 hours per year) of about ¥260,000 together were estimated at about ¥800,000 in value created per year (same report, p. 52).

For the search time for elderly residents and the rate of reduction in working time for infant monitoring, the city's KPIs set targets (a search time within three hours, and a 20 percent reduction in working time, both for FY2024), but the reports do not present measured values for the reduction rates themselves. This book does not confuse targets with measured values.

Chapter 3. Putting Health Data to Work: Wearables and Community Medicine

Our work on health data began with the Masuda City Smart Healthcare Promotion Project, launched in 2018. It was at once an implementation program and Japan's first medical research study to aggregate home blood-pressure data over IoT for medical analysis. It kicked off in Masuda on July 20, 2018, with measurements starting that October. The background was stark: Masuda's stroke incidence and mortality exceeded the national average, and some 60 percent of stroke patients had hypertension.

The method aggregated home blood-pressure readings over IoT. Participants measured their blood pressure morning and evening, together with activity levels and urinary sodium/potassium ratios; the data was analyzed at Shimane University and fed back in line with the

Japanese Society of Hypertension guidelines. The consortium joined the City of Masuda, the Masuda Medical Association, Shimane University, and OMRON Healthcare, with leading hypertension researchers from Shiga University of Medical Science and Tohoku University. It began with 306 workplace participants and expanded toward 1,000–2,000 citizens. The later joint research on wearable blood-pressure monitors stands on this foundation of "measure at home, manage by data."

Watching over begins at the very start of life. At the nursery attached to the Masuda Medical Association Hospital, "smart childcare" monitoring napping infants was implemented: body-movement sensors (baby sensors) detect prone sleeping or a stop in movement and alert caregivers' tablets, while breathing checks are recorded automatically by app. No established method prevents sudden infant death syndrome (SIDS); what is needed is a system that buys time for rescue if the worst happens, and that lightens caregivers' workload so human eyes can go where they are truly needed. The demonstration ran under the MLIT FY2019 supplementary Leading Model Project and was implemented at the nursery in December 2020, where it remains in operation. In July 2019, an MCSCC member company was invited to the Cabinet Office to present baby-tech childcare support. From watching over infants, to blood-pressure management for the working generation, to watching over elderly residents with dementia who walk out alone — "from childhood to old age" is the design of Masuda's health data.

Quantitative Evidence (Chapter 3: Selected Examples)

For infant monitoring, what the MLIT report (FY2019 supplementary, pp. 30, 33) presents is the unit of work and qualitative effects. A caregiver's breathing check is a task of "approximately three minutes per check," and it was confirmed that the ability to check breathing status from another room through the body-movement sensor reduced the frequency of going to perform those checks. However, the report itself states that "quantitative measurement is difficult," and it does not present a measured rate of reduction in working time. Accordingly, this book does not claim a reduction rate as an achieved result. Hearings in the field indicated that the tool is helpful during the thinly staffed evening hours; that reducing the work of checking for breathing abnormalities, an early state of SIDS, is the greatest benefit; and that it helps ease the "weight of responsibility," one of the reasons fewer people seek to work as caregivers.

The health monitoring in Masuda thus developed into MCSCC's smart healthcare program. The initiative "Smart Healthcare Supporting Health from Childhood to Old Age" was selected among 46 entries for internet voting, from 172 entries, in the Cabinet Secretariat's "Winter Digi-den Koshien" (private-sector division). In a related demonstration, the Masuda City Medical Association and San-in Panasonic implemented a monitoring solution at Kunisaki-en, a health-care facility for the elderly, from January 2023, combining facial-

recognition wandering prevention, vital sensors, monitoring sensors, and behavior detection.

We also work on academic validation. Together with the Department of Public Health at Okayama University (Professor Hideyuki Kanda) and Huawei Japan, MCSCC has conducted research using the HUAWEI WATCH D wearable blood-pressure monitor (begun in January 2024 with devices donated by Huawei Japan). In a validation at a care and welfare facility (40 participants), systolic readings nearly identical to those of an upper-arm device were obtained. In a study of high-school esports players, systolic pressure rose by roughly 10 mmHg during matches and recovered within minutes afterward, with the change more pronounced in the winning team — suggesting sympathetic nervous system activation. The results were jointly announced at Huawei Japan’s product briefing in December 2024.

Health data is one of the starting points of a city's data circulation. The wearable is the representative device of the edge layer, and carrying both its accuracy validation and its social implementation is the foundation of trust for the data industry.

Chapter 4. Implementation in the Air: Drone Infrastructure Inspection and Regulatory Reform (Nagasaki)

Before the drones, there were vehicles. MCSCC's Smart Road Monitoring project kicked off in Masuda in June 2018. The idea is simple: city staff already patrol municipal roads every day — so equip those patrol vehicles with GPS (using Michibiki/QZSS for positioning in the mountains), cameras, accelerometers, and other sensors, measure road-surface condition quantitatively in the course of daily patrols, judge it with AI, and feed it into maintenance planning. The monitoring vehicle was delivered to Masuda's civil engineering division in April 2019. In Phase 2, Architect Grand Design, Increment P, KYB (Kayaba), and Nexty Electronics joined, and KYB commercialized the system as a road maintenance support service. At its core is AI: the system learns from data collected by driving over several types of road surface, judges surface categories such as potholes, and records the judgments together with GPS data — and in November 2021 the road monitoring project received the AI & Robot Committee Special Award at MCPC Award 2021. In May 2025, the Mayor of Masuda presented its use at the national conference of the council of municipal leaders on infrastructure maintenance.

The measured road data also has outlets beyond maintenance. Masuda is also a town of health-building through cycling and of cycle tourism, and designing safe cycling routes requires knowing the state of the road surface. In an exchange of views with Ukyo Katayama — former Formula 1 driver and director of a cycling team — held together with KYB's Core Technology Laboratory, the ability to visualize the road condition of routes drew a positive evaluation. A single dataset serving both the administration's maintenance

planning and the health and tourism of citizens: a working example of the cross-domain principle.

The demonstration of "measuring" roads thus began with vehicles on the ground, passed through vehicle trials in Nagasaki City, and advanced to drones in the air — whose leading edge is the following program.

In July 2025, MCSCC's drone program was adopted under the Cabinet Office's "Survey Program for the Development and Construction of Advanced Services and for Regulatory and Institutional Reform," as a project of Nagasaki Prefecture's National Strategic Special Zone (the "Kizuna" cooperation zone). The implementation structure was as follows: the prime contractors were MCSCC, Architect Grand Design, and Dentsu Kyushu, and Torbizon, Tokyo Denki University, and Security Store participated as subcontractors (Cabinet Office report, March 13, 2026).

The subject of this project is the inspection of roads (road surfaces) above public roads. Under the current screening guidelines, roads on a Level 3.5 flight route may only be crossed temporarily. The purpose of the project was to obtain evidence for a regulatory relaxation that would permit longitudinal flight above public roads, using as alternative safety measures the detection of vehicles and people by AI together with automatic avoidance (evacuation flight), and the use of lightweight aircraft whose impact in a fall is smaller. The actual flights were permitted as Category II flights with access-control measures in place; project vehicles were driven to create pseudo-Level 3.5 conditions, under which the evacuation flights were verified. The demonstration was conducted on November 19–20, 2025, in the Nomozaki district of Nagasaki City (the Nomominami Coast Road).

Quantitative Evidence (Chapter 4: Selected Examples)

The principal measured values from the Cabinet Office report are as follows.

- **Evacuation flights (Measured):** A total of 25 evacuation flights were performed in response to vehicles approaching from ahead and from behind. The average time from vehicle detection to completion of evacuation away from the road was 2.4 seconds ± 0.2 seconds. Measurements were made by analyzing recordings of the control screen at 60 frames per second, in units of 0.0167 seconds.
- **AI vehicle detection (Measured):** At three locations and at altitudes of 30–100 m, vehicle detection was 100 percent (at a confidence threshold of 55 percent). The AI responded about 0.2 seconds faster on average than the operator, and its variability was about half as large.
- **Recommended operating conditions (Conclusion of the report):** Assuming a maximum oncoming vehicle speed of 60 km/h, the report concluded that road inspection by flight above roads can be realized at an altitude of 60 m, a drone speed

of 2 m/s, an AI confidence threshold of 40 percent, and with two cameras used together — a wide-angle camera (for monitoring) and a telephoto camera (for road-surface inspection) (p. 86).

- **Accuracy of road-surface inspection (Measured):** In verification conducted with the cooperation of Tokyo Denki University, the telephoto camera detected a large pothole (50 cm × 50 cm) at every altitude from 30 to 100 m. Small potholes and longitudinal cracks, however, were not detected, and the report states these limits explicitly.
- **Cost (Estimate):** The drone method, at ¥1 million per 100 km plus AI analysis costs, can be roughly comparable to vehicle-mounted road inspection systems (¥1 million per 100 km). Road-surface profiling vehicles cost more than ¥7 million per 100 km (pp. 19–21).
- **Room for application (quoted from prefectural materials):** Nagasaki Prefecture's managed roads total about 2,453 km, but only about 740 km are measured by road-surface profiling vehicles; the rest depends on simplified surveys and daily patrols (p. 14).
- **Use in disasters (qualitative):** Hearings with Nagasaki Prefecture confirmed that the prefecture does not directly own drones and has not established operating rules for actual disasters. The project's proposal is "dual use": transferring the flight routes, risk information, and operating structures accumulated in peacetime inspections to disaster response (pp. 82–91).

The point of the project is to take on, head-on, the airspace directly above public roads. For Japan's drone industry to mature in logistics and inspection, it needs an operational record and safety evidence in the airspace closest to daily life. The next steps indicated by the report are to add evidence toward relaxing the rules for Level 3.5 longitudinal flight — through automation of evacuation flight, continuous automated flight over sections of several kilometers, and route generation using Michibiki. As a further stage beyond that, MCSCC plans to take on Level 4 flight (beyond-visual-line-of-sight flight over inhabited areas without assistants) in 2027. This is MCSCC's own statement of plans, not a plan set out in the report.

Chapter 5. Designing for Islands: The Nagasaki Island MaaS Concept and Physical AI

Nagasaki is the node of this book. Patterns born in Masuda are applied in Nagasaki to Japan's remote islands — another frontier of challenges — and at the same time are carried to Indonesia through historical ties dating back to Dejima. The drones of Chapter 4 and the MaaS of this chapter are the implementations at that node.

Nagasaki Prefecture holds Japan's largest archipelago of remote islands. In May 2022, at the 3rd Digital Garden City Forum in Nagasaki (hosted by MCSCC, supported by Nagasaki Prefecture), MCSCC presented the **Nagasaki Island MaaS Concept** as a proposal to the prefecture. Its definition:

"Capturing the distinctive challenges of Nagasaki, home to Japan's largest group of remote islands: realizing a land–sea–air multi-use 'Island MaaS' model that can be switched by purpose — daily use, tourism, logistics, and emergency medicine."

The key is switching by purpose. The same island transport resources — buses, ferries, vehicles, drones — are re-bundled according to use: daily mobility, tourism, logistics, emergency medicine. That is what MaaS design means for an island.

In the communities that would host this concept, implementation is accumulating. Shinkamigoto Town was adopted in FY2020 under the MLIT Smart Island promotion demonstration survey (with Japan Airlines as the council's representative) and demonstrated transport of medical specimens, blood, fresh fish, and daily goods by unmanned helicopter. Under the National Strategic Special Zone framework, Level 4 drone delivery of medicines under area-based permission has also been implemented. MCSCC has begun a dialogue toward giving the concept concrete form in this town, where population decline is advancing at one of the fastest rates in the country.

The next layer is physical AI. Even when MaaS bundles "movement," its two ends — loading at the port, unloading in the village, the sites of care and watching-over — still need human hands. On islands where the workforce is shrinking, the stage has come for robots and humanoids to support those hands. MCSCC has launched a humanoid / physical AI project in Nagasaki: the implementation of convergence, where decisions in cyber space are executed in physical space.

Chapter 6. Implementation in Asia: Indonesia

Indonesia is MCSCC's principal field of implementation and its Asian Hub. Along the axis of this book, it is the place where patterns created in Masuda — after passing through the node of Nagasaki — are first implemented at scale. Our Representative Director serves in an advisory capacity to Indonesian local governments, and in January 2026 he was appointed a Senior Fellow of Citieslab Nusantara, a Jakarta-based non-profit think tank.

The starting point was a national program. In April 2021, MCSCC's proposed "Smart Mobility Infrastructure Development Study for Smart City Development in Bali, Indonesia" was adopted under the Ministry of Economy, Trade and Industry (METI) Feasibility Study (FS) Program for the Overseas Deployment of High-Quality Infrastructure (the formal report was issued in February 2022, 352 pages in total). The commission was undertaken jointly by

four organizations — the Masuda Cyber Smart City Consortium (its name at the time), Dentsu, Architect Grand Design, and KYB — with MCSCC coordinating the whole on the basis of its record in Masuda. The study had three working groups (WGs): WG1, the road monitoring system (led by KYB); WG2, the MaaS platform (led by Dentsu); and WG3, EV charging infrastructure (led by Hokuriku Electric Construction). The methods proven in Masuda were connected to a survey of the EV special zone that Bali Province planned to establish (the Sanur area and Nusa Penida Island). It should be noted that, at the time of the FS, this EV special zone was at the stage of "planned to be established, with its specific content to be decided in the future"; it was not an existing institution (report, p. 26).

During fieldwork from November 29 to December 10, 2021, consultations were held with the head of the National Research and Innovation Agency (BRIN), the state electricity company PLN, the Bali provincial government, the Bali Tourism Development Corporation (ITDC), Grab Indonesia, and others. On November 29, 2021, BRIN head Handoko offered comprehensive support, as recorded in the report (p. 331). In Sanur, field hearings recorded that it would be best to proceed with the Sanur Development Foundation (YPS) — which brings together three local villages — as the point of contact (p. 192), a direct foundation for the MOU concluded with YPS in October 2022.

Quantitative Evidence (Chapter 6: The Bali FS — Selected Examples)

The principal figures from the METI FS report (February 2022) are as follows.

- **Effect of road monitoring (Estimate):** In Denpasar City, it was estimated that optimizing repairs on the basis of measurement could reduce road maintenance costs by 12 billion rupiah (about ¥100 million) per year (p. 121). At the same time, the report concluded that the city currently has no direct demand for quantitative measurement data, and that it is important to propose, at the national level and as a package, a framework for the effective use of repair budgets based on measurement (pp. 119–120).
- **The MaaS market (Estimate):** Of Bali's inbound market, the combined scale of local mobility and activities was estimated at about USD 4.31 billion (pp. 155–156). In a survey of 1,114 foreign tourists, stated willingness to use tourism MaaS was high in every country, exceeding 90 percent on average (Actual, survey; pp. 157–161).
- **The EV roadmap (Plan values, PLN and the Bali Provincial Transport Agency):** Bali's EVs were projected at 1,000 four-wheeled vehicles and 8,000 two-wheeled vehicles in 2025, and 5,300 four-wheeled and 41,200 two-wheeled vehicles in 2045 (p. 253). The report also contains a table giving the 2025 figure for four-wheeled vehicles as 800, so the original source should be checked when citing this figure.
- **Charging infrastructure (Estimate):** The construction cost of an SPKLU (public EV charging station) was ¥6.6 million per station (calculated by Hokuriku Electric

Construction, p. 254). In PLN's estimate, the payback period for a charging station was about 6.6–6.9 years (p. 239).

- **Electricity demand outlook (Plan values, RUPTL 2021–2030):** Bali's electricity sales were projected to grow from 5,297 GWh in 2021 to 9,298 GWh in 2030, and peak load from 880 MW to 1,515 MW (p. 265).
- **Conditions for commercialization (Conclusion of WG3):** With a revenue structure centered on four-wheeled EVs, capital recovery is difficult; designing revenue sources to be collected "broadly and thinly," and making use of PPPs and public frameworks, were identified as challenges (pp. 263, 308). The report presents both the size of the market and the severity of the conditions for commercialization.

This Bali FS did not end as a study. The following developments, however, came after the report (February 2022) and are recorded separately in time. Hokuriku Electric Construction, which led WG3, concluded a joint-venture agreement in December 2022 with AAI and a local energy company (capital of ¥95 million; Hokuriku Electric Construction holding 70 percent), established a joint-venture company in Jakarta in the first half of 2023, and entered the rooftop solar power equipment leasing business — its first overseas expansion. The commercialization work in the FS — Hokuriku Electric Construction's calculation of SPKLU construction costs, its preparation of basic data for the Sanur area, and related work — formed the foundation for this step. It should be noted that the joint-venture scheme itself is not stated in the FS report. In December 2022, Hokuriku Electric Construction also concluded a memorandum with Udayana University on joint research into solar power systems, leading to the completion of a joint research facility in April 2024 (Udayana University is likewise not mentioned in the body of the FS report). The significance of this project lies in the fact that the FS became the starting point that produced tangible results — a joint-venture company and a university joint research facility (MCSCC website, February 3, 2023, citing a Kitanihon Shimbun article of February 2, 2023).

Survey work also continued in the capital region. In February 2023, under a program adopted by the Agency for Natural Resources and Energy, MCSCC conducted a field survey in the Jakarta Special Capital Region, consulting with Transjakarta, a vice head of the National Research and Innovation Agency (BRIN), and the Jakarta provincial government's Communications and Informatics Agency. The results were compiled as the Feasibility Study on Sector Coupling of Waste-to-Power Generation and Smart Operation Systems for EV Buses in the Jakarta Special Capital Region (March 2023).

Quantitative Evidence (Chapter 6: Selected Examples)

The principal figures from the Jakarta FS report are as follows.

- **The scale of waste (Actual, field survey):** Waste delivered to the Bantar Gebang final disposal site was 7,500 tons per day (2022), with an increase to 8,000 tons per day in prospect. The landfill mounds reach 30–40 m in height (pp. 15, 17).
- **Results of waste-to-power generation (Actual):** The pilot plant operated by BRIN (100 tons per day) incinerated 14,507.65 tons and generated 1,425.35 MWh in 2021 (p. 18). This is not an estimate on paper; a demonstration is operating on site.
- **The current state of EV buses (Actual, hearings):** Transjakarta operates about 4,200 buses, carrying about 800,000 passengers per day. It has only 52 electric buses, all of them made by Chinese manufacturers. Its EV conversion target for 2030 is about 10,047 buses (pp. 34–39). The hearings recorded that there is currently no concrete proposal for introduction from Japan, while also recording the response that Japanese-made buses can be procured.
- **Commercial viability (Estimate):** Even under Plan B (direct combustion), against annual revenue of about ¥437 million, a balance gap of about ¥328 million per year is premised on being covered by subsidies and other support (p. 78). Charging 100 EV buses requires 20,000 kW per day, which waste-to-power generation (577 kW) cannot cover alone; the design realistically presumes a combination with PLN electricity. The report contains no quantitative estimate of CO2 reductions, and carbon-neutral credits were excluded because they could not be calculated (pp. 61–62, 78). The figures honestly show that the margin of a stand-alone project is thin and that lateral expansion and public support are premises.

The work is now expanding laterally. In June 2025, MCSCC concluded a memorandum of understanding on smart city development with the Rebana Metropolitan area of West Java (seven regencies and one city). What MCSCC offers is "urban structural design capability based on semiconductor architecture" and a "human-centered, problem-solving approach" — connecting the patterns proven in Japanese communities to urban development in a growth economy. Development is also under way in Sanur, Bali. On the academic side, in April 2026 MCSCC concluded an MOU with the School of Architecture, Planning and Policy Development (SAPPK) of the Bandung Institute of Technology (ITB), establishing a base for research and human-resource development.

This partnership has also taken root in Nagasaki itself. On February 27, 2026, Nagasaki Prefecture and MCSCC co-hosted the "Indonesia Economy, Industry and Human Resources Symposium" at Dejima Messe Nagasaki, to a full house. Speakers included a deputy head of BRIN, a deputy head of the Rebana Metropolitan Authority, the co-representative of Smart City Orchestra, and JETRO; our Representative Director lectured on "Nagasaki and Batavia: History and Future." At the symposium, a letter from the CEO of the Rebana Metropolitan

Authority to the Governor of Nagasaki was presented, proposing trilateral cooperation among Nagasaki Prefecture, Rebana, and MCSCC, and an inter-city partnership linking Nagasaki's 21 municipalities with Rebana's seven cities — some ten million people. Nagasaki, once tied to Batavia in the Edo period, joins Indonesia again in the age of the smart city: history and future met in the same place.

Implementation has now entered the stage of formal agreements. On August 27, 2026, at BRIN headquarters in Jakarta, a tripartite MOU was signed among MCSCC, JOYCLE Inc., and Indonesia's National Research and Innovation Agency (BRIN). Its core is a feasibility study for deploying JOYCLE's resource-circulation and GX technology — adopted under the Tokyo Metropolitan Government's Global South GX Promotion Project — in the Rebana Metropolitan area of West Java, with MCSCC member Architect Grand Design supporting as a coordination partner. A hearing with a director-general of Indonesia's Ministry of Environment was also held. From surveys and proposals to implementation under agreements with government institutions: the work in Indonesia has entered its next phase.

The economic outlook reinforces this partnership. Driven by electrification and smart cities, Indonesia's GDP (purchasing power parity) is projected to reach roughly USD 7.5 trillion by 2040, ranking fourth in the world and surpassing Japan (per the Representative Director's published analysis, 2022). The "patterns" of a country at the frontier of societal challenges, and the "fields of implementation" of a growth economy: joining the two is the basic form of MCSCC's international work.

Chapter 7. Expansion into Europe: Bulgaria / Growing Academic Ties: Vietnam

Bulgaria is the country MCSCC positions as the EU Hub. In July 2026, at the invitation of Bulgaria's Deputy Prime Minister and Minister of Economy, Investment and Industry, our Representative Director visited Bulgaria and met with the Prime Minister, relevant ministers (innovation, digital transformation, environment, energy, and others), the presidents of Sofia University and the Technical University of Sofia, and semiconductor companies including Melexis and Visteon. The themes were nuclear power and small modular reactors (SMRs), AI semiconductors, the smart nation / smart city agenda, and the accession preparations of Bulgaria, an OECD accession candidate country; MCSCC proposed a policy white paper. The visit confirmed that in Europe's growth economies as well, there is demand for "patterns of solutions" and for a blueprint of the city.

One concrete point of connection is flood countermeasures. Bulgaria, too, struggles with flooding, and the LPWA water-level monitoring pattern proven and still operating in Masuda — aggregating levels of small rivers and channels over low-power wireless, and turning them into number-based sluice-gate operations and warnings to residents — is an

exportable package of problem-solving in its own right. At the government meetings in late November, we will present this disaster-prevention IoT as a concrete theme for cooperation.

Bulgaria's role as the EU Hub does not stop at cooperation with a single European country. The knowledge of urban implementation gained in Indonesia, the Asian Hub, will be connected to Europe's institutions, academia, and industry, while the technological and policy knowledge gained in Europe will be returned to implementation in Asia. In the future, by integrating the two hubs, MCSCC's international city partnerships will develop into a circular network linking Asia and Europe, starting from Japan.

The circle of academic partnership is widening at home and abroad. The partnership with Vietnam is positioned as the next expansion of the flow — Masuda → Nagasaki → Indonesia. It is part of an effort to reconnect, in both scholarship and implementation, the relationships that Nagasaki has historically held with Asian cities. In Japan, in June 2023 MCSCC concluded a cooperation agreement with Shiga University's Center for Data Science and AI Innovation, and is forming projects on AI and big data for smart cities in Japan and overseas — holding analytical capability on the academic side underpins implementation in the brain layer. As one example of the expansion of academic networks, at "Data Spaces Week 2026" (Hongo Campus), in which the University of Tokyo's Graduate School of Interdisciplinary Information Studies and the Data Society Alliance (DSA), among others, are involved, MCSCC Special Advisor Bernardus Djonoputro delivered an online lecture entitled "An Overview of Technological Urbanism in Asian Cities." That the person responsible for MCSCC's work on the Indonesian side spoke at a forum where the data communities of Asia and Europe meet shows that academic and implementation networks are widening on the shared language of data spaces. In Asia, in September 2026, IETDSO (the International Energy & Technology Development Support Organization) — an academic member organization of MCSCC — concluded a comprehensive partnership agreement with Vietnam National University, Ho Chi Minh City. Our Representative Director serves as an advisor to IETDSO for smart cities, AI, and semiconductors, and dialogue with Vietnam is now deepening.

Chapter 8. Proposals: Designing the Smart City as a "Future Industry"

Six proposals emerge from MCSCC's practice:

1. **Design from challenges, not from technology.** Put R (research) before D (development) and begin from field realities and numbers. Product-out policy produces investment without an exit.

2. **Treat the circulation of data as an industry.** The data a city generates not only improves health, mobility, and infrastructure; the processing base itself — semiconductors and AI data centers — is an industry.
3. **Accept that each layer moves at a different speed.** The brain layer (data centers) is fast; the edge layer (local implementation) is slow. Design so that the revenue and technology of the fast layer fund implementation in the slow layer.
4. **Fit the cost structure to local capacity.** Unless a municipality with an annual budget on the order of ¥20 billion can sustain it, it is not social implementation. As the estimate for Masuda's common platform shows (about ¥1.45–1.57 million initially), a design that starts small and adds services is realistic for local communities.
5. **Patterns cross borders.** A solution proven in a country at the frontier of societal challenges answers the future challenges of growth economies. International partnership that divides proof-of-concept and implementation supports both Japan's regions and the world's growth at once.
6. **Integrate the two hubs.** Connect Indonesia, the Asian Hub, with Bulgaria, the EU Hub, and circulate implementation knowledge, policy, academia, people, and industry between them. Do not end international expansion as an accumulation of individual projects; design the inter-regional network itself as the foundation of the future industry.

A smart city is not a project to make a city clever. It is the cradle of future industries. MCSCC will keep drawing that blueprint — and building it.

Appendix

Selected Quantitative Evidence

The following table lists the principal quantitative data used in the chapters. The categories distinguish "Measured" values actually measured in the reports, "Estimates" calculated on stated assumptions, "Targets" set as KPIs and the like, and "External statistics" drawn from the statistics of external institutions.

Indicator	Value	Type	Source
LPWA transmitter range (2 mW / 20 mW)	200–300 m / about 1 km	Measured	MLIT report (FY2019 supplementary), pp. 24, 28
Battery life of the monitoring transmitter (alternating-output model)	About 100 days	Measured / specification	Same report, p. 24
Annual cost of elderly monitoring (model with 12 base stations)	About ¥693,000–783,000 per year	Estimate	Same report, Tables 5-5 and 5-6

Indicator	Value	Type	Source
Cost of infant monitoring (model with 29 nurseries in the city)	About ¥2.41 million per year in total; about ¥83,000 per nursery per year	Estimate	Same report, Table 5-7
Caregivers' breathing-check work	About 3 minutes per check (reduction in frequency confirmed qualitatively; no measured reduction rate)	Measured / qualitative	Same report, pp. 30, 33
Elderly search time / reduction in infant-monitoring working time	Within 3 hours / 20 percent (FY2024)	Target	Same report, p. 6 (city KPIs)
Time until discovery (discovered after more than 3 hours had elapsed)	45 percent	External statistics	Survey by the Alzheimer's Association Japan (2018), quoted in same report, p. 29
Cost of the common platform (model with 10 LPWA base stations)	About ¥1.45–1.57 million initially; about ¥54,000–204,000 per year	Estimate	MLIT report (FY2020), p. 48
Server CPU load of the common platform (with 2 services connected)	A few percent or less	Measured	Same report, p. 23
Smart stake data acquisition	Every 30 minutes; no loss for about 2 months	Measured	Same report, p. 26
Drone reception distance for smart stakes (about 2 mW)	About 800 m in a straight line	Measured	Same report, pp. 30–31
Road monitoring diagnosis time	Degree of damage grasped within 24 hours after patrol	Measured	Same report, Supplementary Material 5-4
Value created by electric fences (30-are target field)	About ¥800,000 per year (harvest recovery ¥540,000 + reduced work ¥260,000)	Estimate	Same report, p. 52
Effect of electric fences (30-are target field)	Previous year's harvest fell to about 30 percent of the undamaged level → almost no damage	Measured	Same report, p. 52
Drone evacuation flights	25 flights; average 2.4 seconds ± 0.2 seconds	Measured	Cabinet Office report (March 2026), pp. 40–45
Drone AI vehicle detection (3 locations; altitudes 30–100 m)	100 percent	Measured	Same report, p. 50
Recommended operating conditions for drone inspection	Altitude 60 m; speed 2 m/s; threshold 40 percent; two cameras used together	Conclusion	Same report, p. 86
Drone inspection cost	¥1 million per 100 km + AI analysis costs (profiling vehicles: more than ¥7 million)	Estimate	Same report, pp. 19–21
Nagasaki Prefecture managed roads /	About 2,453 km / about 740 km		Same report, p. 14

Indicator	Value	Type	Source
surveyed by profiling vehicles		External statistics (prefectural materials)	
Waste delivered to the Bantar Gebang disposal site	7,500 tons per day (2022)	Actual	Agency for Natural Resources and Energy FS report (March 2023), pp. 15, 17
BRIN pilot plant (2021)	Incinerated 14,507.65 tons; generated 1,425.35 MWh	Actual	Same report, p. 18
Transjakarta buses in operation / EV buses	About 4,200 / 52 (all made by Chinese manufacturers)	Actual	Same report, pp. 34–39
Transjakarta EV conversion target for 2030	About 10,047 buses	Target	Same report, p. 39
Balance gap under Jakarta FS Plan B	Premised on about ¥328 million per year being covered by public support and other means	Estimate	Same report, p. 78
Savings from optimizing road repairs in Bali Province	12 billion rupiah per year (about ¥100 million)	Estimate	METI Bali FS report (February 2022), p. 121
Bali MaaS market (local mobility + activities)	About USD 4.31 billion	Estimate	Same report, pp. 155–156
Willingness to use tourism MaaS (1,114 foreign tourists)	More than 90 percent on average	Actual (survey)	Same report, pp. 157–161
Bali EV roadmap	2025: 1,000 four-wheeled and 8,000 two-wheeled vehicles / 2045: 5,300 four-wheeled and 41,200 two-wheeled vehicles	Plan (PLN and the Provincial Transport Agency)	Same report, p. 253 (note the variant figure for four-wheeled vehicles in 2025)
SPKLU construction cost / payback (PLN estimate)	¥6.6 million per station / about 6.6–6.9 years	Estimate	Same report, pp. 254, 239
Bali electricity demand outlook	Electricity sales: 5,297 GWh in 2021 → 9,298 GWh in 2030; peak load: 880 MW → 1,515 MW	Projection (RUPTL)	Same report, p. 265
Social implementation of the Bali FS (joint-venture company)	Capital of ¥95 million (Hokuriku Electric Construction 70 percent); established in 2023	Actual	MCSCC website (February 3, 2023, citing Kitanihon Shimbun)

Principal Primary Sources

- Ministry of Land, Infrastructure, Transport and Tourism, Smart City Demonstration Survey, FY2019 Supplementary Budget: Final Report (September 13, 2021; Masuda Cyber Smart City Consortium).
- Ministry of Land, Infrastructure, Transport and Tourism, Smart City Demonstration Survey, FY2020: Final Report (September 13, 2021; Cyber Smart City Consortium).

- Ministry of Economy, Trade and Industry, Report on the FY2021 Feasibility Study Program for the Overseas Deployment of High-Quality Infrastructure (Smart Mobility Infrastructure Development Study for Smart City Development in Bali, Indonesia) (February 2022; 352 pages in total. Commissioned to: Masuda Cyber Smart City Consortium, Dentsu, Architect Grand Design, and KYB; MCSCC served as overall coordinator).
- Program adopted by the Agency for Natural Resources and Energy, Feasibility Study on Sector Coupling of Waste-to-Power Generation and Smart Operation Systems for EV Buses in the Jakarta Special Capital Region (March 2023; Cyber Smart City Consortium).
- Cabinet Office, FY2025 Survey Program for the Development and Construction of Advanced Services and for Regulatory and Institutional Reform (Survey toward More Efficient Infrastructure Inspection by Drones, with Disasters in View): Report (March 13, 2026. Prime contractors: MCSCC, Architect Grand Design, and Dentsu Kyushu; subcontractors: Torbizon, Tokyo Denki University, and Security Store).
- MCSCC website (https://matrix-cyber.org/): report on the social implementation of the METI FS (Hokuriku Electric Construction, February 3, 2023); announcement of Bernardus Djonoputro's lecture at Data Spaces Week 2026; and other materials.

MCSCC Timeline (selected)

Year	Milestone
2016	Smart city initiative begins in Masuda City, Shimane (Masuda Model)
2017	Ground evaluations of the space-derived radio technology "Hyper LPWA" begin. IoT water gauge system demonstration starts in Masuda (to February 2019, then continued operation; YRP R&D Promotion Association award in 2018)
Jul 2018	"Masuda City Smart Healthcare Promotion Project" kicks off — Japan's first medical research study aggregating home blood-pressure data over IoT (from 306 workplace participants toward citizen scale)
2018–2020	Inter-city collaboration with Yatsushiro City: "Smart Agriculture IoT (wildlife countermeasures)" — electric fences × LPWA; the target field recovered from severe damage in the previous year to "almost no damage" (MLIT report)
2018	MCSCC founded. Early PoC of "the MCSCC FIWARE" (foundation of the Cyber City Brain) on Europe's open platform begins. Smart Road Monitoring project kicks off in Masuda (monitoring vehicle delivered to the city's civil engineering division in April 2019)
Apr 2019	At the request of the Masuda Police Station, a working group on monitoring elderly residents with dementia who walk out alone is formed (MCSCC, city Elderly Welfare Division, police station). The history of the request is also recorded in the MLIT FY2020 report, p. 52
2019–2021	Selected as one of the fifteen "Leading Model Projects" under the MLIT Smart City Model Program (announced May 31, 2019); adopted three consecutive years
Dec 2020	Infant monitoring ("smart childcare") implemented at the nursery attached to the Masuda Medical Association Hospital (MLIT FY2019 supplementary Leading Model)
Apr 2021	Bali smart mobility infrastructure study adopted under METI's FS program; fieldwork the same year; MOU with the Sanur Development Foundation (YPS) in October 2022

Year	Milestone
Nov 2021	Road monitoring project receives the AI & Robot Committee Special Award at MCPC Award 2021
May 2022	Nagasaki Island MaaS Concept proposed to Nagasaki Prefecture at the 3rd Digital Garden City Forum in Nagasaki
Dec 2022	Social implementation from WG3 of the Bali FS: Hokuriku Electric Construction concludes a joint-venture agreement and a memorandum on joint research with Udayana University
Jan 2023	Monitoring solution demonstration begins at Kunisaki-en care facility, Masuda
Feb–Mar 2023	Field survey of the Jakarta Special Capital Region conducted under a program adopted by the Agency for Natural Resources and Energy; the waste-to-power × EV bus sector-coupling FS report is compiled
Jun 2023	Cooperation agreement concluded with Shiga University's Center for Data Science and AI Innovation (project formation on AI and big data for smart cities)
First half of 2023	Hokuriku Electric Construction's joint-venture company is established in Jakarta (rooftop solar leasing business). The joint research facility with Udayana University is completed in April 2024
Dec 2024	Joint research on wearable blood-pressure monitoring announced with Okayama University and Huawei Japan
Jun 2025	MOU concluded with the Rebana Metropolitan area, West Java, Indonesia (7 regencies, 1 city)
Jul 2025	Drone inspection model adopted under the Cabinet Office / National Strategic Special Zone program (Nagasaki "Kizuna" zone). Evacuation flight demonstration at Nomozaki in November 2025 (Category II, pseudo-Level 3.5 conditions)
Jan 2026	Representative Director appointed Senior Fellow of Citieslab Nusantara (Jakarta)
Feb 2026	"Indonesia Economy, Industry and Human Resources Symposium" held at Dejima Messe Nagasaki, co-hosted with Nagasaki Prefecture (full house). A letter from the CEO of the Rebana Metropolitan Authority to the Governor of Nagasaki proposed trilateral cooperation and inter-city partnership
Apr 2026	MOU concluded with SAPPK, Bandung Institute of Technology (ITB)
Jul 2026	Visit to Bulgaria at government invitation; meetings with the Prime Minister and ministers
Aug 2026	Under the Tokyo Metropolitan Government's Global South GX Promotion Project, a tripartite MOU among MCSCC, JOYCLE, and Indonesia's National Research and Innovation Agency (BRIN) is signed in Jakarta (feasibility study for deploying resource-circulation / GX technology in Rebana)
Sep 2026	Comprehensive partnership agreement between IETDSO and Vietnam National University, Ho Chi Minh City. MCSCC Special Advisor Bernardus Djonoputro delivers an online lecture at Data Spaces Week 2026 (University of Tokyo Graduate School of Interdisciplinary Information Studies, DSA, and others)

About MCSCC

- Name: Matrix of Cyber Smart City Consortium (MCSCC), a general incorporated association
- Founded: 2018
- Representative Director and Smart City Architect: Yoshihisa Toyosaki
- Website: https://matrix-cyber.org/

This revised edition is based on MCSCC's activities as of October 2026. Figures and facts are drawn from published materials, Japanese national project reports, and the consortium's records. The type of each figure (Measured / Estimate / Target / External statistics) is identified in the text and the appendix.