FAST COMPANY

Toyota has built a fully functioning Japanese city to use as a laboratory

Woven City is Toyota's 176-acre city where it tests new technology and ideas about the future of the urban environment. And it holds lessons for how any city can innovate.

[Photo: Toyota]

BY Masaki Hamura and Richard Florida

Just south of Mount Fuji, on a modest 176-acre site once occupied by Toyota's Higashi-Fuji automotive factory, a groundbreaking urban experiment is underway. Launched in 2024, Phase 1 was completed last year and houses 360 residents, most of them Toyota employees and their families, as well as some researchers and retirees. It will ultimately be home to some 2,000 residents.

The name "Woven City" symbolizes both the city's interwoven road networks and Toyota's historical roots in the textile industry, capturing the fusion of mobility, digital infrastructure, and human interaction.

Woven City is neither a typical planned community nor a smart city in the usual sense of the term. It was deliberately launched to as an "urban operating system"—a real-world living laboratory or—designed to learn and refine itself through real-world data and resident feedback.


[Photo: Toyota]

Kaizen in city form

Woven City can be seen as an extension of Toyota's pioneering philosophy of continuous improvement or *kaizen* that sees workers as the source of true innovation. As the city comes to replace the industrial corporation as the fundamental platform for the knowledge age, Woven City empowers residents to actively shape and build their community.

At its core is the premise that residents are not passive users of predesigned systems but active cocreators of emerging ones. Woven City explicitly includes diverse demographic groups such as families, retirees, engineers, and researchers, ensuring feedback reflects a broad range of lived experiences, making the city more relevant and effective as an urban prototype.

To support this cocreation, Toyota built extensive feedback mechanisms into Woven City's design—traditional ones, like participatory design workshops, behavioral surveys, and resident advisory panels, and sophisticated digital technologies that track behaviors. Activities ranging from strolling through public plazas to residents' usage of pop-up kiosks provide continuous data, which is used to improve systems and services.

As Toyota moves from Software Defined Vehicles to the broader strategic concept of comprehensive mobility, Woven City provides a prototype of a Software Defined City. Additionally, Woven City extensively employs Internet of Things (or IoT) devices and digital twin technology, enabling urban planners to proactively simulate urban scenarios and

optimize systems such as energy, waste, water, and lighting before deploying them in the real world


[Photo: Toyota]

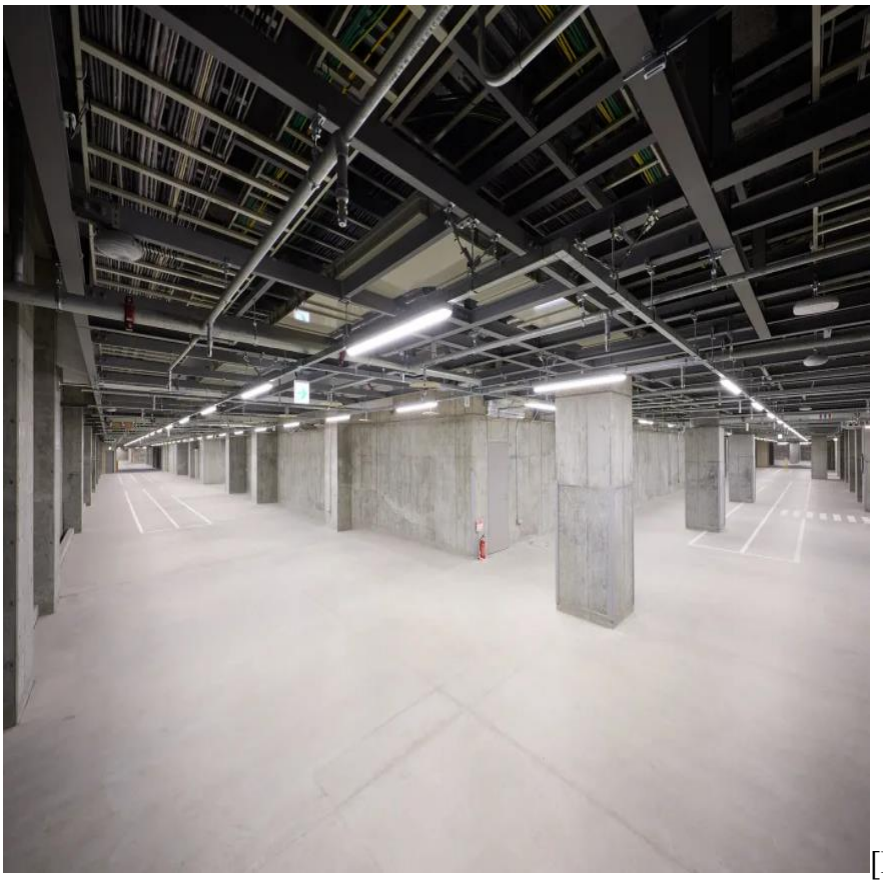
An autonomous vehicle testing ground

Toyota has integrated diverse corporate partners into Woven City's collaborative framework. Daikin, for example, tests adaptive air-quality solutions within residential units. UCC Japan operates mobile cafés to enhance community interaction. DyDo and Nissin pilot nutrition kiosks that monitor and respond dynamically to consumer preferences, gaining insights into how people interact with these systems in real-time settings.

The city's buildings are primarily constructed from sustainable, carbon-neutral wood and topped with photovoltaic solar panels. Critical infrastructure, including electricity, water, and internet cables, is installed underground to enhance safety and aesthetic appeal.

The city's infrastructure enables testing autonomous driving and other innovations that are difficult to try out in traditional urban settings. It integrates above ground and underground systems. These systems are continuously optimized based on the congestion. Pedestrian and cycling promenades are configured as linear parks, with flank lanes that are dedicated to low-speed autonomous shuttles.

e-Palette shuttles provide accessible transportation, deliver goods, and offer mobile retail, supported by sensors and communication systems to manage traffic flows**.** Amenities like pop-up cafés and pocket parks are introduced when data indicates declining foot traffic, enhancing street-level vitality.


[Photo: Toyota]

A city beneath the city

Underground, an extensive network of tunnels facilitates discreet and efficient delivery and waste management via autonomous vehicles and robots. This underground tunnel system connects the city's 14 buildings through approximately 25,000 square meters of subterranean tunnels.

Autonomous delivery robots can do their work without having to deal with changing weather conditions, significantly enhancing efficiency and maintaining pedestrian-friendly streets. Interestingly, for the world's leading automotive company, privately owned gasoline-powered vehicles are prohibited, reflecting the city's sustainability commitment.

Central to Woven City's sustainable infrastructure is a decentralized hydrogen microgrid, supported by rooftop solar panels, stationary fuel cells, and replaceable hydrogen cartridges for vehicles and residences. This portable hydrogen cartridge system provides enough to power typical household appliances for several hours.

These cartridges are relatively light and are designed to be portable and easily replaced, supporting decentralized and resilient power systems. When elderly residents had difficulty using this system, it was quickly redesigned to include assisted lifts and to work with voice-command technologies.

A dense array of sensors monitors everything from pedestrian flows, energy consumption, and environmental conditions to usage patterns in public spaces. This data enables planners to test scenarios, adjust shuttle schedules, and reconfigure public spaces based on actual usage patterns and surveys, recalibrating street lighting, for example, to improve nighttime vibrancy.

[Photo: Toyota]

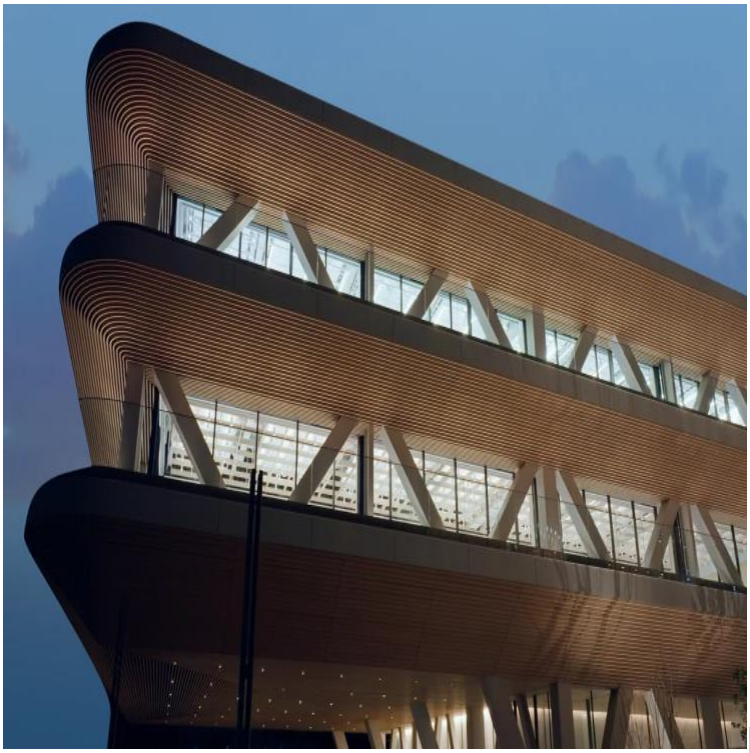
What can we learn from Woven City?

Ultimately, Woven City's transformative approach can be distilled into three fundamental principles:

- **Start small, iterate fast:** Validate ideas through limited real-world trials before scaling—treating the city not as a finished plan, but as a continuous experiment.
- **Continuous real-time feedback:** Urban technologies and systems that use resident input to quickly and continuously adapt how the city works.
- **Empowered residents:** Engage residents not as passive users, but as active cocreators whose lived experiences shape and refine urban systems in real time

Taken together, these three principles reflect the core notion that cities are dynamic learning systems that must continually adapt based on residents' behaviors and feedback.

As a self-described urban prototype, Woven City's approach offers useful insights for communities of all shapes and sizes—from new "cities from scratch" to existing downtowns and suburbs. Toyota intends to extend successful innovations from Woven City to urban areas around the globe.


[Photo: Toyota]

Many new tech-driven cities—like Google's Sidewalk Labs, California Forever, and Saudi Arabia's NEOM—have stumbled by aiming too big, overspending, following rigid plans, and overlooking community input. Woven City demonstrates a smarter path: start small, involve residents from day one, and stay flexible. By treating the city as an ongoing experiment, Woven City continuously evolves based on real-time feedback from its residents. This bottom-up approach drives genuine innovation and builds trust in ways top-down projects rarely achieve.

Downtowns today face significant challenges, as the shift to remote work reduces commuting, increases office vacancies, and cuts transit ridership. Woven City's real-time feedback methods can help businesses, planners, and policymakers reimagine a better future for downtowns. Real-time data can pinpoint which office buildings should transition into housing, mixed-use spaces, or entertainment venues.

Monitoring technologies can also help guide transit improvements—optimizing bus routes, subway lines, and redesigning streets to better support pedestrians and cyclists. This approach can accelerate the transformation of downtown areas from single-purpose business districts into vibrant, connected, and diverse neighborhoods.


[Photo: Toyota]

Suburbs, historically built as bedroom communities, are also experiencing profound changes. With the rise of remote work, more people seek to integrate their work and home lives. Woven City provides a useful template with its emphasis on mixed-use development, flexible infrastructure, and reduced reliance on cars.

Its approach can help suburbs transform car-dominated infrastructure by incorporating linear parks, increasing green spaces, promoting walkability and cycling, and efficiently managing delivery vehicles. Its approach can also help suburbs learn how to more strategically array offices, coworking spaces, retail, and recreational facilities, and create more vibrant main streets and town centers. Woven City's flexible building technologies could be a model for adapting traditional single-family homes into more versatile live-work environments.

Woven City updates Jane Jacobs' fundamental insights for our high-tech age. Unlike so many other smart city efforts, it shows how new technologies can help cities evolve and learn from the day-to-day knowledge and activities of the people who inhabit and use them.

ABOUT THE AUTHORS

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