

Woven City Press

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Advocates for Inventors' Interview ①

An environment free from common obstacles empowers inventors to focus on bringing their ideas to life.

Advocates for Inventors' Interview ②

Virtually Replicating the World to Accelerate the Problem-solving Process



Woven City— A mechanism for exploring well-being that benefits others

At the heart of the Toyota Group is a young man who wanted to help his mother live a better life. Sakichi Toyoda invented the automatic power loom to make his mother's weaving work easier. His commitment to taking action for the sake of others' happiness is the core of the philosophy that has driven Toyota for decades and continues to propel us forward. Caring for others has been important as we evolved from a loom manufacturer to a car maker, and is critical to our transformation into a mobility company. Today his legacy is dedicated to improving the overall quality of life on the planet. Motivated to deliver the freedom and joy of movement to everyone – Mobility for all. We've replaced outdated transportation concepts with a new set of mobility principles and dynamic approaches that allow us to invent a mechanism to generate well-being that goes far beyond what has been possible until now. Woven City is an important model of our efforts to benefit all humanity and make well-being accessible to all. Unlike hypothetical theory, fantasy, or science fiction, we are working with partners to build a real-life test course for mobility. There we will pilot experiments and develop innovations that can propel society forward and form the future fabric of life. The innovations we make today, and through the endless evolution of Woven City going forward, will expand the possibilities of mobility. We hope you're as excited about our ever-evolving city and the future as we are!

Woven City History

Weaving the future with the threads of our past

For Toyota, Woven City is not only a bold leap forward but a tribute to what has come before. This site in the city of Susono in Shizuoka Prefecture, Japan was once home to the Higashi Fuji Plant, where Toyota led Japan's motorization and manufactured many of its iconic cars for over half a century.

In November of 1966, Toyota completed construction of the automotive proving grounds (later the Toyota Motor Corporation Higashi Fuji Technical Center), and a year later in May of 1967, operations began at their passenger car assembly plant (later the Higashi Fuji Plant). There, 40 models of automobile were manufactured, including the Mark II series, Crown Comfort, and Century models. The Higashi Fuji Plant made incredible accomplishments for the automotive industry.

However, its doors closed for the final time in December of 2020. Instead, after the Great East Japan Earthquake on March 11, 2011, Toyota decided to set up a company in the Tohoku region to create jobs, contribute tax dollars, and provide long-term support towards recovery in the area.

Up until its closing, the Higashi Fuji Plant employed a cumulative total of 7,000 workers and produced 7,520,000 motor vehicles. It had long driven the motorization of Japan while supporting the livelihood of many. Situated on the former site, Woven City is also a realization of the promise between Akio Toyoda and the plant's employees who always put their colleagues and the feelings of others first. The vibrant history, spirit, and legacy of the Higashi Fuji Plant will always be part of the origin story of Woven City. At this site, the Woven City inventors will weave life-enriching ideas into the future fabric of life.



An endlessly evolving city

Construction on Phase 1 is scheduled for completion in the summer of 2024, and preparations will be made for the start of some initial trials in 2025. From that starting point, this "endlessly evolving city" will continue making strides and improvements into the future.



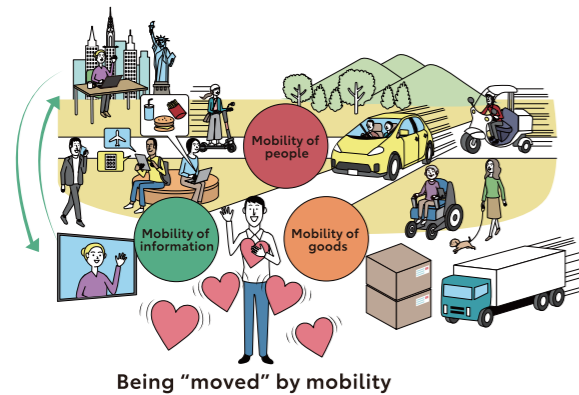
Conceptual Art for Phase One

What is Woven City?

An exploratory mechanism for **expanding mobility** and well-being to **build the future fabric of life**

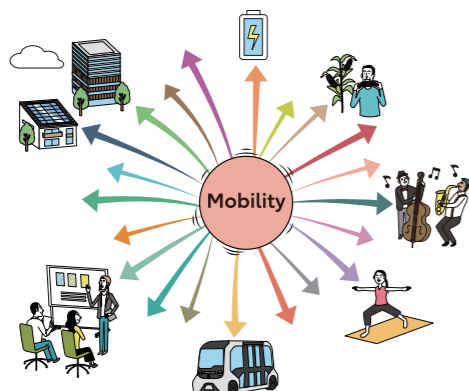
Mobility: A new way of thinking

A global shift in transportation thinking has occurred and Toyota has fully embraced its transformation into a mobility company. Dedicated to contributing to a thriving society, we are enhancing the many ways that people, goods, and information move on the planet. By improving the safety and efficiency of daily experiences like getting where we need to go, receiving packages, and virtually connecting with others, our goal is to enable greater global harmony by fostering everyday joy and satisfaction thereby making the goal of well-being for all a reality.



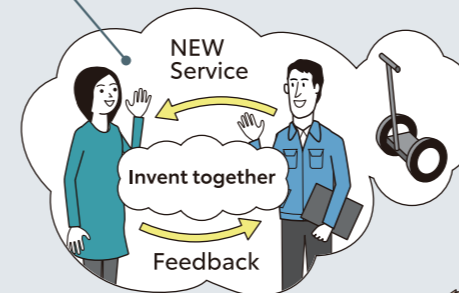
Exploring new possibilities in the mobility of information, goods, and people

For us at Toyota, Woven City is a living laboratory for exploring ways to expand how mobility can enrich humanity. Our researchers will test ideas related to the mobility of information, goods, and people in fields such as food and agriculture, energy, healthcare, education, entertainment, and more. Through these experiments, we plan to develop ideas that move and inspire people and refine them before integrating them into the daily living of the future.



A city of innovation where everyone is an inventor

Despite coming from broad and diverse backgrounds, everyone living in Woven City is an inventor. Some are employees of Toyota and partner companies, some are independent developers, and others are ordinary residents, from children to senior citizens. In Woven City, to qualify to be an inventor you only need a desire to make a positive difference in the lives of others. The constructive input from all of these inventors, inspired by their personal experiences, helps build a strong foundation for a future of societal well-being.



About Woven City 01

A real-world proving ground for new ideas

Inventors are constantly tackling multiple aspects of a new idea; What's the best execution? How will it perform in practice? Typically, this type of exploration and experimentation occurs through simulations developed from behind a desk. In Woven City, inventors test their ideas in a full-scale urban environment flowing with real life. Finally, incremental improvements can be made based on real-time feedback reflected in the real world.



Well-being for all

We aspire to make well-being through mobility accessible to everyone in the community while meeting individual needs. This journey starts with Woven City.

About Woven City 02

An environment that nurtures innovation and accelerates development

All inventors eventually hit a wall—a point that is difficult to get past without outside help. From knowledge-sharing to business startup and expansion assistance, a wide range of material and digital resources are provided to the inventors in Woven City. By taking advantage of this support, inventors can rapidly develop ideas for inventions inspired by the situations they come across in their daily lives.

Leading Inventors to Their Solutions

The Woven City Mechanism

Inventors

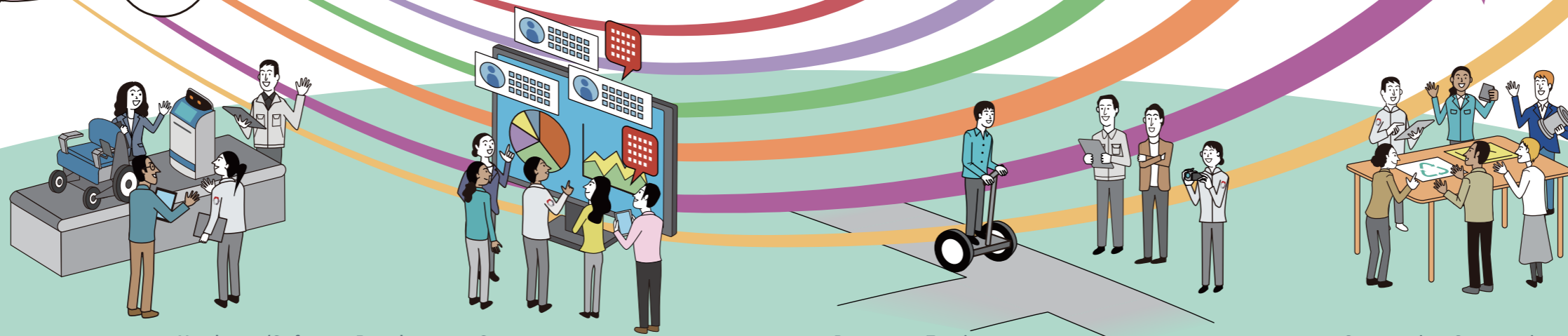


Toyota Group Developers Corporate Developers Start-ups / Entrepreneurs The Residents of Woven City

At Woven City, an inventor is anyone who acts “for others.” An inventor may include corporate developers like Toyota, start-up workers, entrepreneurs, and even the residents themselves – of any age. All of these types of inventors regularly face challenges and, within the test course of Woven City, they will have the support of Toyota and the advantages of its strengths and assets to help overcome those challenges and find real-world solutions.

Over many years of manufacturing cars, Toyota has established its core ideology of continuous improvement. Built on this rich culture, the unique mechanism of Woven City allows for experimentation without fear of failure and will cultivate experiences with wide ranging support in critical areas. Toyota’s hardware and software technology support and prototype testing will use data and feedback to enable constant progress.

Woven City residents will live in active co-creation and help inventors to bring ideas that are “for others” to life. This complete immersion will accelerate the development of their ideas for improving the everyday lives for all people.



TOYOTA WOVEN CITY

The next page features those who support the inventors via the Woven City mechanism.

Advocates for Inventors



An environment free from common obstacles empowers inventors to focus on bringing their ideas to life.

The path of innovation is lined with change and facing challenges along the way is inevitable. How does the Woven City mechanism support inventors and help them address these obstacles when they arise? Development is accelerated by experimentation in real-life situations. This approach significantly shortens the time between discovery, commercialization, and practical application of new ideas. Here we have interviewed two of our engineers to find out more about how the Woven by Toyota process incorporates problem solving.



Q: Please tell us about your current project.

Suzuka: At Woven City, my role is to act as a bridge between inventors and the Woven by Toyota engineers. I learn about the problems faced by inventors, study them, and then work to develop Woven City solutions most suitable for addressing those needs. In short, I facilitate the inventors in their efforts to, “build the future fabric of life” and contribute to the “well-being for all.”

Marouane: Currently, we are developing an app to expedite every aspect of the process of bringing ideas to life within Woven City. The inventors and residents of Woven City will be able to interact with one another and access a wealth of useful information. The inventors will be able to share their projects, encourage participation in pilot programs, and get detailed and immediate feedback. We are also working on providing some supporting tools to distribute their testing directly through the app as well.

Q: What brought you to work at Woven City?

Suzuka: My background is as a data scientist and my specialty is in mathematical optimization. This is a method where we formulate various real-world problems as mathematical models to help us troubleshoot and optimize decisions for ongoing improvement. In order to ensure that our solutions will be useful in actual situations, we continuously update the mathematical models based on the results of testing.

Woven City, the “ever-evolving city,” applies this same iterative process of creating new inventions and services through a cycle of problem identification and improvement. Knowing that this process aligns with my expertise and experience, I was drawn to the project.

Marouane: After graduating from university, I worked as a software engineer in my home country of Morocco. There I

developed tools supporting major corporations integrating their apps without our services. It was at this early stage of my career that I learned the Kanban methodology for software development which originated from Toyota Motor Corporation. Suffice to say, when I heard about the “Woven City” project, I was very excited to join this challenging and unique project.



Q: How does your work directly support the inventors?

Suzuka: We approach inventor issues as if they are our own. Whatever I’m working on I am always considering, “How can we make this process as seamless as possible?” and “What is the best way to provide useful feedback?” Every day I listen to the issues faced by inventors and expand and refine new ways that I can utilize data and our technology to solve those issues.

Marouane: I always keep an eye out for the little problems in everyday life. Even in my day-to-day work, I try to be helpful by supporting other teams and solving problems with technology. For example, I am considering creating an app that automates the administrative process of alerting us when employee letterboxes in the office are full. I believe that apps that take care of everyday needs within the company can be put to good use in Woven City.

Q: How do you plan to support the Woven City inventors going forward?

Marouane: My goal is to create an environment where inventors can focus on turning their ideas into reality. The real advantage we can offer is to provide well designed tools for collecting useful feedback. We then manage and analyze the empirical data to proactively improve their technologies and services. Effective feedback from users is essential for inventors and I look forward to working with Suzuka and various teams to find better ways to accomplish this.

Suzuka: Some inventors have a vision for global distribution of a service but are unable to develop the app needed to make it a reality. Woven City provides support, tools, and a fertile environment for development that makes it much easier for inventors to create apps so inventors can just focus on their ideas and the development of their services. We have already attracted a diverse lineup of advanced technologies and look forward to even more inventors taking advantage of our services so that they can quickly implement their projects and make a positive impact on society.

Ayami Suzuka

Ph.D. (Engineering). A data scientist specializing in mathematical optimization. She has been connecting inventors and engineers as a customer engineer at Woven by Toyota since 2022.

Marouane Boumeziane

After graduating university as an engineer, he started work in software development (both in Morocco). Since 2022, he has been designing and implementing software solutions for Woven City at Woven by Toyota.

Problem-solving for Inventors Case 01

(Toyota Motor Kyushu)

Lacking In-house Resources for Software Development

We are trying to launch a new app on our own but we don’t currently have the right skill sets or adequate financial resources to begin development from scratch.

Support for App Development & Distribution

- Woven City offers a variety of ready-to-use apps with basic functionality, including the ability to make payments and book services within Woven City. Apps can also be easily customized by the inventors themselves.
- These apps also collect feedback from Woven City residents, which become the basis for quickly implementing the next batch of improvements.



Toyota Motor Kyushu’s participation in the Woven City pilot testing, which will be conducted in the city of Susono, Shizuoka Prefecture, has not yet been decided.



Virtually Replicating the World to Accelerate the Problem-solving Process

The use of the term 'digital twin' has skyrocketed over the last few years. This technology may improve product performance by enabling countless testing scenarios that are much too difficult to replicate in reality. By exploring testing in the virtual world we will be able to bring new technologies and systems into real-world applications faster.

Since childhood, Shoya Kojima of Woven by Toyota has wanted to help others. Through his work developing advanced digital twin technology, he hopes to uncover ways to solve the problems identified by inventors.

Q: Please tell us about the digital twin you're developing now.

Kojima: The simulation I'm currently working on uses data collected from the real world to reproduce the target phenomena and projects it into a virtual space. This method is much faster than conventional simulations and by using the digital twin to test new technology and services, we can quickly make necessary changes and feed them back into the real world to get improved outcomes. Although we are still in the pilot phase, once Woven City opens, our calculations will reflect the actual data from the city and we will enter the full-scale utilization phase.

Q: How do you approach work on a daily basis?

Kojima: Ever since I was a child, I've cared deeply about others. When people are suffering, I always feel a strong urge to help them. However, since I can be pretty shy, making altruism a part of my job allows me to help people and contribute to society without being limited by personal hang ups. In my previous job, I developed software for social infrastructure, but without a real testing environment, I was never able to truly see its impact. Digital twin technology is very different. Now we can thoroughly test and measure the effectiveness of products or services in Woven City in real time. Not only is that satisfying, but once we fine-tune the platforms, we will have the opportunity to expand these capabilities and solve many more problems around the world.



Q: How will using a digital twin help to solve problems?

Kojima: Toyota Motor Corporation and its approach to traffic safety is a great example of the problem-solving advantages of the digital twin. One of the strategies for achieving Toyota's ultimate goal being a society with zero traffic casualties, is to develop safe advanced driving technology. However, for safe automated driving to become the norm, it is crucial to consider city infrastructure and traffic rules together. For the Woven City, we are developing a virtual solution that will allow us to study countless situations that take into account the mobility, people, and city infrastructure to preemptively visualize – and ideally eliminate – the risk of traffic accidents. We are still in the proof-of-concept stage, but we believe that identifying and solving even one dangerous scenario could enable us to contribute to improved traffic safety – in Woven City, and around the world. Digital twins are also useful for improving logistics operations and enhancing operating efficiencies of factory production processes. I am excited to continue to explore the full potential of this technology and discover all of the ways it may be helpful for others.

Q: How do you plan to support the Woven City inventors?

Kojima: Digital twins are able to delve deeply into the underlying needs of Woven City inventors. Communication starts at the early development stages where we identify inventors' challenges, virtually explore their source, and use digital twins to virtually hypothesize solutions. Communication throughout the process is critical to making sure our proposed solution continues to align with their vision. Sometimes the team spends months in front of the whiteboard in heart-to-heart discussions about the results we hope to achieve. I get so passionate that I can even get a little uncivilized about these development deliberations (laughs). I am very passionate about doing everything that I can to help inventors make their powerful ideas become reality and about making the digital twin platform increasingly effective in the process.

Shoya Kojima

Shoya Kojima is a software engineer experienced in social infrastructure who has been working for Woven by Toyota on the development of digital twins for traffic safety and logistics since 2022.



Problem-solving for Inventors Case 02 (Toyota Motor Corporation)

Obstacles to Real-Life Traffic Safety Testing

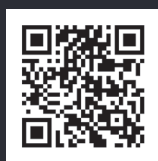
Intentionally causing actual physical crashes in the real world is not an option. However, to ensure the safe flow of traffic and prevent accidents, it is crucial to test accident scenarios in a variety of environments that are active with pedestrians.



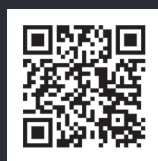
Digital Twin Platform

- Developing hardware and services begins with historical data. Virtual simulations of the integrated mobility, people and the city infrastructure may provide hypothetical insights that help prevent accidents and optimize development efficacy.

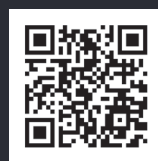




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