Fujitsu Uvance

FUJITSU

Trusted Society

**Digital twin to social digital twin
— the future of smart cities**

Contents

The essential nature of the digital twin

The role of digital twin technology in shaping smart cities is simply indisputable. Because it is constantly updated with information from its physical counterpart, nothing can match its ability to analyze data, monitor systems, and run simulations as if they were working with the physical asset.

In the context of a smart city, digital twin technology is no longer optional. It's essential for identifying areas of improvement through information collected from the built environment – making use of everything from sensors to drones and mobile devices. Once it has this valuable data, it can feed it through powerful AI and advanced analytics. This provides decision makers with effective simulations in a fraction of the time traditionally taken. Whether it's an urban planning challenge, mobility requirement, or disaster response scenario, a digital twin can give trustworthy, accurate insights.

So, it's clear that a digital twin is paramount for any city embarking on the journey of digital transformation. However, it's not perfect.

The data it generates is cold and calculated, leading to criticism that it only impacts the hard factors, without considering what makes a city, a city – the people in it.

What's the next step for cities looking to provide everything residents, workers, and visitors need? It's time for a more human way of thinking.

From digital twin to social digital twin

Typical smart city digital twins manage a lot of data, but it's all what we'd call 'hard data'. Its focus is on physical details; how many cars are on the road, how many people use a train station turnstile etc. But for cities to deliver a better way of living for the people in them, we need to take another step forward. We need to start thinking about soft factors too. That's what a social digital twin aims to provide. Alongside the physical data on how many people are using a certain road at night, or how bright the streetlights are, a social digital twin also provides a complete digital reproduction of societal behaviors. It does this by constructing a human model and a social model that react in real time to changes in society at large, reflecting shifting relationships between the behavior of people and goods, the economy, and wider society in incredibly minute detail.

As a pioneer of this cutting-edge technology, Fujitsu's Social Digital Twin is growing in capability by the day. Currently, it combines the behavioral economics model Prospect Theory and AI, allowing for incredibly accurate simulations that can infer the behavior of people in the real world. To do this, it needs to consider human biases, such as our tendency to overestimate losses and underestimate potential gains, as well as situational factors that influence behavior, such as weather. By combining these models with digital twins, the new technology makes it possible for city planners and businesses to more accurately predict how changes in human behavior interact with evolving conditions in the environment, and to better inform decision-making.

This incredible technology is designed to meet the concept of Society 5.0, whereby technologies and innovations, including big data, simulations, and AI, converge to provide a better quality of life for human beings. Without doubt, it's an exciting time for city planners, as well as society as a whole.

Part of our excitement is due to the sheer flexibility offered by social digital twin technologies. Multiple applications and use cases can benefit from their implementation. So, let's examine some of them.

Human-first mobility

With cities looking to tackle congestion and air pollution, planners are constantly looking for ways of increasing public transport, cycling, and walking. Fujitsu's Social Digital Twin can be an effective tool for testing theories on this subject. That's because it can be used to more effectively predict the variables influencing individuals to change their mode of transport. Whether it's the weather conditions discouraging walking and cycling, pedestrianized areas extending car journey times or anything else, it's a vital tool that can help businesses and city planners understand the impact of any actions. That's not just large-scale transformation either. Simple maintenance jobs, such as road closures or the changing of bus routes can be modeled, and their impact assessed.

Our technology is already making a difference too. Fujitsu trials on the Isle of Wight in the UK used digital rehearsal technology to test the effects of people switching from cars to e-scooters, before the project was implemented. The technology considered how e-scooters would affect CO_2 emissions in local areas; how discounted fees for users who returned the scooters to central hubs would affect behavior; and much more. Ultimately, the aim was to find the right solution that would reduce congestion and the environmental impact of car use on the Isle of Wight. By enabling local authorities to test schemes virtually, it helped alleviate a lot of the risk involved in a new scheme, while also informing transport policy and positively contributing to the wider economy.

You can read more about our Isle of Wight scheme here

Urban planning

What constitutes the ideal city has changed.

Cities built in the 20th century often prioritized the car, with wide streets and multiple lanes for traffic. Now, public transport, the bicycle, and the pedestrian are often the priority, if cities are to meet air quality and carbon emissions standards.

By using the Fujitsu Social Digital Twin platform, cities can start to take steps to refocus their urban setups. Whether it's putting in new bridges, pedestrianizing central boulevards, or just adding more bus routes, they can analyze and predict the behavior of people, as well as the effects and potential risks of interventions. It can even be used for short term construction measures, so planners can see the results of an outcome, but also the effects of the construction process, informing policy and decision-making.

The true power of a social digital twin is its adaptability. As discussed, requirements change. Expectations change. Technology advances and public opinion evolves. As long as a social digital twin is kept up to date with data from both hard and soft sources, it will continue to provide relevant data and shape the future of the urban environment.
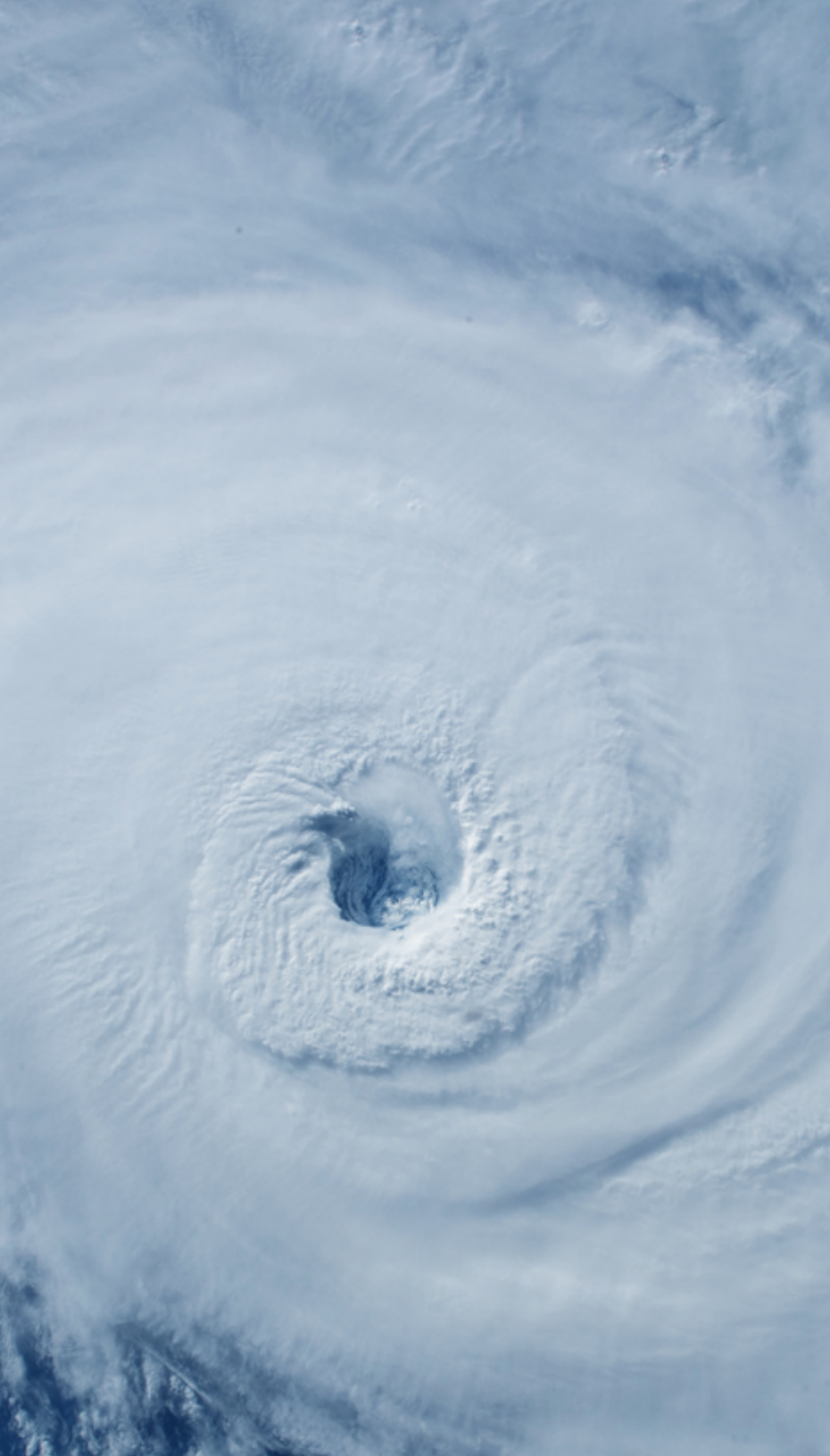
Disaster response

Digital twin applications can play a key role in predicting and mitigating natural disasters, in a variety of different forms. Advanced computational models can be used to calculate everything from the extent and impact of flooding, to identifying areas where wind speeds could reach dangerous levels.

As before, it all comes down to the quality of provided data. With accurate precipitation data, it can visualize what will flood and to what extent. From there, it can predict the level of damage and allow cities to identify weak spots requiring extra defensive measures. The same principle can be applied to everything from hurricanes to wild fires.

As well as disaster mitigation via digital resilience in infrastructural planning, a social digital twin can also be invaluable in saving lives when disaster does strike. Its modeling can also be used to identify safe evacuation routes and action plans for response services. It can even do this in real time, making suggestions based on weather IoT sensors and forecasting services, so rescue teams are never caught out.

Our vision of a smarter city

The smart city of the future will simply not happen without significant technological advances. Fujitsu's vision of Smart Cities is based on a human-centric approach, leveraging advanced technology and data to create sustainable, resilient urban environments, designed to be exciting, safe, healthy places for people to live.

Of course, this isn't possible without significant support. That's why we work closely with major industry players, such as our underlined recently announced partnership with Hexagon.

This gives cities access to leading sensors, software, and automation solutions from a global expert in digital reality technology.

While digital twin technology has already proven immensely valuable for business and public services everywhere, it's just the first step in quite an exciting evolution for city planning. Fujitsu's Social Digital Twin takes things one step further by bringing human interest back to the heart of every decision. Because no city would be worth living in, if it wasn't for the people that make it great.

Contributor
Nick Herbert

As the Head of Government & Public Safety in Fujitsu Global Business Division, Nick consults with senior leaders who are undergoing digital transformation initiatives and directs Fujitsu's solutions and products to assist in the modernization and acceleration of their digital services.

Currently located in Australia, Nick has had experience globally, specifically within the APAC market and the European market, where he has held leadership roles in strategy, architecture, and product management.

Nick is passionate about transforming services for the benefit of citizens and society.

Fujitsu
Uvance

FUJITSU

To find out more visit
Trusted Society - Fujitsu Uvance