

## Bylined Article

# Reprogramming Human Behavior for a Greener Future: How Social Digital Twins Drive Decarbonization

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**We all know that reducing carbon emissions is a priority, but it's hard – even on an individual basis. Imagine this – it's a wet and cold Friday evening and you're about to pop out to the shops to grab a few essentials to make dinner. The shops are a 10-minute walk – or three minutes on an e-scooter – but it's dark and rainy, so you take the car. We've all done it, even though we know the car isn't the number one choice for protecting the environment.**

Or how about this? The battery on your EVC is getting low, so you plug it in overnight even though you're not planning to use it for several days, and could easily have waited to charge it on renewable energy the next day – simply because you're worried that you'll forget the next day.

These are classic patterns of human behavior. They're deeply rooted in our brains, and it's proven very hard to convince people to change – although a new technology called Social Digital Twin (SDT) could be the tipping point. Here's why.

So-called SDTs are a transformative technology. They provide data-driven insights into human behavior and enable the simulation of complex social systems to inform policies and drive systemic change toward a more sustainable future.

And it's these data-driven insights that are helping to reprogram human behavior in small and subtle ways that are helping with the decarbonization of society. It's happening charge-by-charge and journey-by-journey.

It works by using Artificial Intelligence to interrogate vast datasets that provide all the information needed to make a change for good: behavior patterns, consumer interactions, market trends and external influences like the current and forecast weather conditions.

For the first time, this leads to a nuanced and dynamic understanding of the factors driving individual and collective choices – the factors that combined to convince someone that driving was the easiest option – or that they couldn't wait to plug in. This ability to model and predict human responses is what is starting to make SDTs a powerful tool for organizations seeking to understand, anticipate and even influence behaviors to achieve specific outcomes, particularly in sustainability.

Let's dive into some examples. On the UK's Isle of Wight, Fujitsu was part of a SDT study into human behavior that has proven so successful that we're about to try it out on a much larger scale in Norwich, along with Beryl, a micro-mobility service provider. The Isle of Wight trials pinpointed how pricing and placement of e-scooter rental bays influenced travel choices – in other words, we started to decode the magic combination of factors that would convince people to rent an e-scooter – and to understand how we could replicate those to influence more people to take a green option next time.

In another example, Fujitsu worked with the World Business Council for Sustainable Development (WBCSD) and Arcadis on a project that strategically timed EV charging schedules to coincide with periods of high renewable energy generation on the electricity network using the UK's National Grid data. Fleet operators could then choose the window when already plugged-in EVs would actually receive a charge for a remarkable 15% reduction in CO2 emissions from EV charging, simply thanks to using more renewable energy.

It's studies like that – which focus on the many behind-the-scenes factors that influence human behavior that are making SDTs a compelling – and important – area of research for Fujitsu, in line with our AI Commitment. This outlines five fundamental principles that guide our approach to ensuring the responsible and beneficial use of AI.

SDTs can even help us understand and then influence more mundane choices – such as the deciding factors that influence commuters to drive or take the train. A recent study Fujitsu ran with Arcadis perhaps unsurprisingly revealed that factors such as parking costs at stations and the placement of mobility hubs have a significant role in the decision made by individuals as to their choice of transport. Understanding this is the first step towards being empowered to use this data intelligently and creating optimum scenarios where people are more easily convinced – perhaps even subconsciously – to choose a more carbon-friendly option. What's more, our trials proved this was possible without increasing travel costs or commute times – so nobody needed to make a personal sacrifice for the greater good.

These examples all highlight three areas where Fujitsu is keen to collaborate with other organizations to explore the digitally-enabled decarbonization benefits that SDTs can unlock. Modeling human behavior, predicting outcomes and facilitating data-driven decision-making empowers stakeholders to develop and implement effective strategies for a more sustainable future.

- **The Data Ecosystem:** Data sharing is the foundation of effective SDT development and deployment. Transportation and energy providers and urban planners can participate in collaborative data ecosystems, contributing relevant data, collaborating on SDT development, and establishing data governance frameworks that ensure responsible and ethical data use. By working together to create a rich and diverse data landscape, we can enhance the accuracy, comprehensiveness, and impact of SDT models.
- **Industry Verticals:** Organizations in sectors ranging from manufacturing and healthcare to retail and energy have the potential to address specific decarbonization challenges. Conducting feasibility studies, piloting SDT projects, or engaging with technology providers like Fujitsu can unlock new possibilities for optimizing operations, reducing emissions, and help create a more sustainable future.
- **The Development of Ethical and Responsible SDTs:** As with any powerful technology, ensuring the responsible development and use of SDTs is paramount. Active participation in discussions and initiatives that focus on the ethical implications of SDTs is crucial. This includes addressing concerns related to data privacy, algorithmic bias, and the potential for misuse. By prioritizing ethical considerations, we can ensure that SDTs empower individuals, promote fairness and contribute to a more just and sustainable society.

As our early field trials have shown, Social Digital Twins show true promise in harnessing the power of data-driven insights to accelerate progress toward a decarbonized future.

Fujitsu, with its commitment to Human Centric innovation and expertise in SDT development, is ready to partner with organizations across industries to unlock the transformative power of this technology and pave the way for a more sustainable and equitable world.

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Dr. Makiko Hisatomi leads Social Digital Twin research in Europe and conducts research and development activities on sustainability. With over 20 years of experience in this field, she has been implementing IoT, AI, and digital twin technologies to solve societal challenges. With a Ph.D. in engineering and a master's degree in sustainable development, she provides the vital link between social science and engineering.

