Breaking silos in a rapidly moving supply chain using Digital Twins

BY ANDRÉ LAURENT – HEDLUND & OSKAR HELÉN CEDERGREN (January 2026)

Division of Engineering Logistics, Lund University Faculty of Engineering (LTH)

A machine breaks down, and every second costs thousands due to stalled production. Finding a spare part should be simple yet supply chains can often be a maze of silos and trapped knowledge. Enter Digital Twins that solves this maze.

Think of a spare part, and the information tied to it, in a global supply chain as a baton in a relay race, and the employees within a company are the different runners. For a team to reach the finish line, the baton must be passed smoothly from one runner to the next. In a perfect world, the speed of the runners, the timing of delivering the baton, and overall time to finish the race is known prior to the race. However, in reality, employees often run this race in a fog. This "fog" is a lack of end-to-end visibility across the supply chains. The employees are in different functional silos, separated by software, responsibilities and priorities. The first runner might be sprinting at full speed while the next is still warming up. When the baton, with the vital information tied to it, is dropped or not passed properly, a delay occurs. The team then must scramble to reactively mitigate the delay instead of proactively preventing it in the first place.

Maintaining a unified, real-time perspective on spare parts across all functions is a daunting yet vital challenge in industries where a downtime of a machine is costly. Companies want to find ways to break down the walls of silos between functions so cross-functional collaboration is enabled. The goal is to achieve a unified view of the process where both the company and the customer can see exactly where a part is at any given moment. One way to solve this is by turning to a technology called Digital Twins. A Digital Twin is a virtual representation of a physical object, system, or network that uses real-time data to accurately reflect its real-world counterpart's behaviour, performance, and conditions. It integrates data from multiple systems to provide a single, holistic perspective of the supply chain.

Can a Digital Twin really bridge the gap between isolated functions? While the potential is there, success requires a strategic approach since implementation can be complex and costly. While the technology offers various capabilities, its high cost makes it essential to identify which functions provide the most value. By focusing on core capabilities like end-to-end visibility and decision support, users can run simulations to test moves in a safe virtual space before they happen. This creates a shared view of processes which replaces guesses with synchronized collaboration.

A relay race is won or lost in the blur of the handoff. Grounded in supply chain visibility theory, this study investigates how Digital Twins can enable end-to-end visibility, improve decision-making, and serve as a cross-functional platform to break down silos. By qualitative interviews and using a Value-To-Effort analysis, high-impact capabilities were identified, resulting in a roadmap conceptual framework to support digital adoption. By acting as the ultimate coach, the digital twin clears the fog for every runner. It turns isolated sprints into a synchronized execution, ensuring the company along with the spare part reaches the finish line not a second too late.

This popular scientific article is derived from the master thesis: *Maximizing Value-To-Effort using Digital Twins in a rapidly moving spare parts supply network*, written by André Laurent – Hedlund and Oskar Helén Cedergren