

# United Innovations



## Special Edition on Industrial Innovations

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# DEUTSCHER STARTUP- POKAL

UNITED INNOVATIONS AWARDS

## Symposium & Finals

Production 4.0 +  
Smart Logistics

6/11/2024 | Münster



AGENDA & MORE

United   
Innovations

GFFT   
Gemeinnützige Gesellschaft zur Förderung  
des Forschungstransfers e.V.

 - BASF  
We create chemistry

The situation in Germany as an industrial location is not good. Car manufacturers and their suppliers are trying to reduce their costs. The chemical and steel industries are no better off. Banks are complaining about increased defaults on consumer loans and are having to adjust their collateral. There have been more pleasant times.

In this situation, it would be nice if federal policy were to appear as a rock in the surf.

Better framework conditions would certainly help us. Some problems are home-made and have grown considerably due to neglect in recent years, e.g. the roads, bridges, railroads, educational facilities, excessive bureaucracy, the amount of legislation and digitalization are in a noticeably poor state.

Other challenges have been added and are a strain on the nerves. The transition to a sustainable society costs money, requires citizens to make their own contributions and is accompanied by floods and forest fires. The rearmament caused by Putin's war of aggression also costs important money and attention. All of this is difficult to manage. Nevertheless, one would hope that the political players would quarrel less and instead implement constructive, well thought-out solutions. Only the greatest optimists hope that a change of government will lead to blooming landscapes. You simply have to accept that the tasks are complicated and that everyone is making an effort.

The situation in the economy seems even more difficult. A substantial proportion of our companies rely on car manufacturing. One



Dr. Gerd Große

might ask oneself whether it is wise to tie one's weal and woe to 2.5-ton vehicles that spend 23 hours a day in the garage. It is possible that more and more people will find investing in such vehicles unsuitable for them. You also have to think about the possibility that engine capacity, acceleration and matte finish will become less important than electronic functions and prices will fall as a result.

So the question arises as to what else humanity needs apart from cars and whether politics and business would like to plant new priorities. Health may be an alternative. Thanks to BionTech, we have recently documented that Germany has outstanding pharmaceutical experts. Nutrition and energy could be other areas in which politicians could invest their dwindling subsidies. In any case, a coherent innovation strategy would make a good impression on the country and its people. There is still a lot to do. So let's move closer together and get down to business.

**Dr. Gerd Große**

Head of United Innovations  
Chairman of the Board of GFFT e.V. &  
Managing Director of GFFT Technologies GmbH





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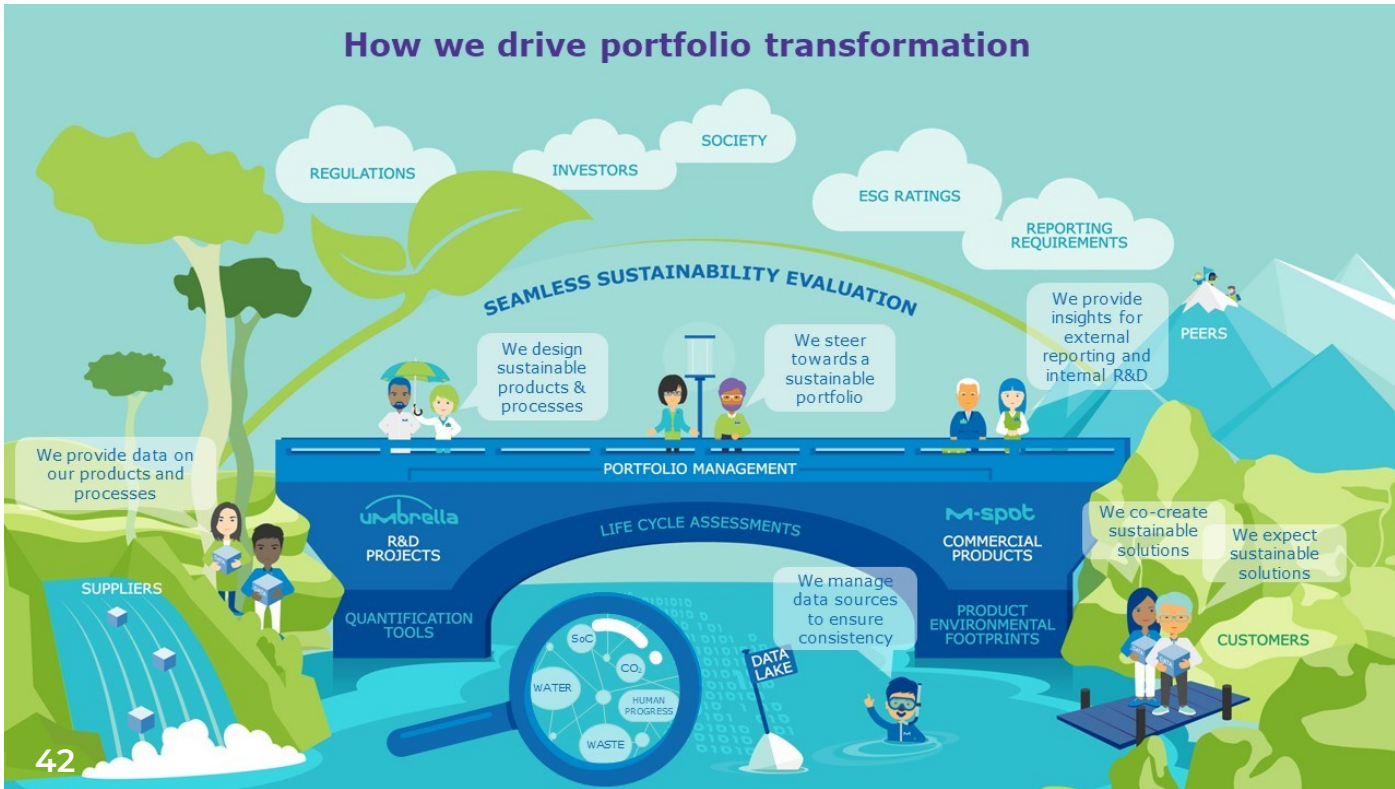
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# United Innovations

United Innovations (UI) is a dynamic force reshaping Europe's innovation landscape. Our mission is to enhance efficiency in large corporations and promote the adoption of cutting-edge methods and technologies. UI focuses on increasing the success rate of new technologies in Europe, bolstering the continent's reputation as a leading innovation hub.

At UI, we emphasize collaboration through our innovation network, enhancing efficiency, quality, and reducing costs. Our partnerships expedite innovation cycles, facilitating the successful launch of new advancements.

Our innovation strategy revolves around identifying innovation needs, assessing current methods and technologies, and establishing effective innovation processes, including the development and implementation of new solutions.

United Innovations invites you to be part of this vibrant evolution in Europe's innovation sector. For more information, visit [www.united-innovations.eu](http://www.united-innovations.eu) or follow UI on LinkedIn.



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# ABOUT US



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# CALENDAR

06/11/2024 Symposium and Final of the German Startup Cup for Production 4.0 and Smart Logistics  
9:00-17:00

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04/03/2025  
16:00-18:00 Symposium on the Future of Logistics 2024/2025

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20/05/2025  
16:00-18:00 Symposium on the Future of Production 2024/2025

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## Take part in an event

If you are interested in participating in a workshop or event, please send us an E-Mail to [info@gfft-ev.de](mailto:info@gfft-ev.de). You will then receive the dial-in data.

All events and further information can also be found at [www.industry-innovations.eu/kalender](http://www.industry-innovations.eu/kalender)







## Discover Our YouTube Channel!

Did you know that our magazine has been on YouTube for quite some time? Visit our channel at the following link: [GFFT YouTube Channel](#). On our YouTube channel, we offer a wealth of valuable content:

- Startup Pitches: Discover emerging startups and their innovative ideas and products.
- Use Cases: Learn how creative solutions are implemented in practice and the value they provide.
- Panel Discussions: Follow engaging discussions with experts from various industries on current topics and trends.

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POKAL  
Maurice Morabel  
Clover Optimization GmbH



# GERMAN STARTUP-CUP

**Symposium and Final of the German Startup Cup for Production 4.0 + Smart Logistics on November 6, 2024, at BASF Coatings in Münster !**

The 3 innovative finalists for the final of On November 6, 2024, BASF Coatings in Münster will host a remarkable event: the Symposium and the Final of the German Startup Cup for Production 4.0 and Smart Logistics. This event offers a unique opportunity to witness groundbreaking innovations and meet the brightest minds in the industry.

The symposium is geared towards professionals and enthusiasts in the fields of production and logistics. It provides a platform for in-depth discussions, lectures, and workshops focused on the latest developments and challenges in these industries. The main themes are digitaliza-

tion, automation, and smart logistics solutions that are shaping the future of production.

The highlight of the day will be the final of the German Startup Cup, where the best startups in the country will present their innovative solutions to a high-profile jury and an expert audience. The finalists will compete for attractive prizes and the chance to develop their ideas further and establish themselves in the market. Among the finalists are outstanding companies that have excelled in the previous rounds of the competition.





# GERMAN STARTUP- CUP

UNITED INNOVATIONS AWARDS

The jury for the final will be announced soon and will consist of renowned experts and industry leaders who will evaluate the startups based on their business models and innovation potential.

In addition to the competition entries, the event will feature an exhibition where other startups and companies will showcase their pioneering technologies and solutions. This offers an ideal opportunity for networking and exchanging ideas and best practices.

## Register Now

Secure your place for this exciting event and become part of an initiative driving digital transformation and innovation in the German production and logistics sector.

We look forward to welcoming you on November 6, 2024, at BASF Coatings in Münster.

Click here to register for Final-Event:

<https://www.united-innovations.eu/startup-cup/Logistics-Production>





# Leading in chemical supply chain

Evonik's Supply Chain Transformation: A benchmark in industry excellence through advanced digital tools and strategic workforce development

An article by Dr. Thomas Schamberg, Evonik



Image credits: Evonik

Evonik Industries, a global leader in specialty chemicals, is undertaking a transformative initiative in its supply chain management. This multi-year, corporate-wide program is designed to establish a fully integrated and customer-centric supply chain system, poised to add significant value for Evonik and its clientele.

The initiative spans Evonik's three chemical divisions and fifteen business lines, having laid a robust foundation since its inception in 2020. A strategic roadmap has been developed, focusing

on pivotal projects in distribution, transportation, customer service, and end-to-end planning, alongside digital innovations and business line-specific enhancements.

Central to this transformation is the adoption of cutting-edge technologies and methodologies. Evonik is implementing Integrated Business Planning (SAP IBP) across its business lines to bolster end-to-end transparency and improve the equilibrium of demand and supply. As one of the pioneering chemical companies to adopt a global

demand planning system, Evonik is now integrating modules for response and supply planning into production planning, significantly bolstering planning efficiency through procurement integration and AI-driven forecasting.

Customer service is also receiving a significant upgrade, with harmonized order-to-cash processes and the integration of AI, which has notably increased the no-touch order rate. This not only expedites service but also enhances accuracy and reliability in meeting customer needs. A globally coordinated, cross-functional customer service effort is further supported by an integrated service platform.

Digitization is another cornerstone of this supply chain overhaul. The Evonik Supply Chain Control Tower enables real-time asset tracking and planning, with seamless data integration from logistics providers into the company's SAP system. This advancement not only augments delivery performance but also fortifies supply chain resilience.

In a move to refine its distribution network, Evonik has created a digital twin, analysed using the advanced analytics platform Optano to determine

the optimal network configuration.

Sustainability is a key focus, with Evonik actively pursuing Scope 3 emissions reduction by engaging suppliers in the search for raw materials with a lower carbon footprint and investigating alternative transport modes, fuels, or technologies.

To underpin these technological strides, Evonik is investing in its workforce. The Evonik Supply Chain Academy offers comprehensive virtual learning journeys, having already upskilled over a thousand global colleagues. This investment in talent ensures the supply network operates optimally, securing a competitive edge for Evonik and its customers.

In conclusion, Evonik's supply chain transformation marries advanced digital tools with a commitment to process excellence and workforce expertise. This strategic initiative is set to heighten customer satisfaction, streamline operations, and bolster the company's commitment to sustainability, further cementing Evonik's status as a vanguard in the chemical industry's supply chain management.



**Dr. Thomas Schamberg**  
SVP Supply Chain  
Excellence  
Evonik Industries AG



# Why traditional fleet management tools are failing you and how orchestration can help

In the fiercely competitive and fast-changing world of cargo logistics, optimizing fleet operations is as crucial as it is hard to do.

An article by SCALAR (part of ZF Group)



Image credits: ZF Group

Sounds like stating the obvious? Try “understatement of the year”. At least that’s what dispatchers the world over have been telling us for quite a while. Even with a multitude of digital tools to help them out, the number of hoops they must jump through each day – juggling between coordinating with drivers, dealing with exceptions to pre-planned schedules, organizing maintenance schedules, and managing customer expectations – is flat out mind-bending.

## What’s keeping fleet managers up at night?

With nearly every cost in the book spiraling upwards, every snap decision you make can directly affect your bottom line. But, amongst decreasing margins and heavy competition, staying with-

in budget without compromising customer satisfaction commands some hardcore computing skills: you need to ensure vehicles aren’t just road-ready and on the move – but that they’re also optimally loaded, always on the most efficient and economical route, and always on time no matter what. And there are all these hurdles standing in your way:

- Avoiding the nightmare of unplanned downtime
- Staying compliant aka chasing moving goalposts
- Meeting those sustainability KPIs
- Enhancing safety and security

## The problem with traditional fleet management systems

When it comes to effectively mastering all these challenges, existing fleet management tools are starting to show a number of limitations, such as:

- They are unable to respond to live changes
- They do not provide the right vehicle information for you to truly understand your vehicle's health and be proactive
- The data they do provide is fragmented, which can lead to missed insights or misinformed decisions
- What's more, they lack the advanced SaaS-based analytical capabilities needed to translate data into meaningful change for your fleet.

One of the main problems is that, traditionally, fleet management systems collect data that then needs to be acted on manually. This means that, for instance, a change in schedule due to a problem on the road will not be resolved without human intervention – leaving you to basically manage your fleet one exception at a time. (And we all know exceptions are the rule in road transport!) An honest miscalculation on your part or failure to respond instantly can seriously disrupt your entire operations.

More importantly, traditional fleet management systems usually lack the intelligence that allows them to properly read and understand data on the fly. This is of paramount importance especially when monitoring truck and trailer health to avoid unplanned downtime or minimize time spent at the repair shop. Case in point: although traditional fleet management solutions can help you keep track of maintenance history and scheduled maintenance visits, they cannot detect – much less predict – say, a leakage in one of your trailers in order to send it to the mechanic instead of out on the road. So you're still stuck with unplanned downtime, longer stay at the repair shop, plus

higher costs for diagnosis. And let's not forget, while all this is happening, your customers now demand real-time updates on their shipment's status and whereabouts. This holistic, integrated approach to transparency is usually missing from the tools available today.

## SCALAR: filling the gaps where other tools fail

To address these challenges and uncover new efficiencies that are still untapped today, the next generation of fleet management solutions must incorporate orchestration capabilities – meaning the ability to automatically execute every aspect of fleet operations in real-time, regardless of fleet size, vehicle type, or the complexity of the situation. Meaning you'll no longer have to lose your sleep over unexpected breakdowns, cost controls, and compliance issues – nor spend your days putting out fires, managing client expectations, and burying yourself under mountains of data.

Leveraging 35 years of fleet management expertise and ZF's unique insights into the workings of the various vehicle components – we are, after all, the world's largest producer and supplier of vehicle systems – we're building the SCALAR fleet orchestration platform to do all those things for you.

Here's a glimpse into the very near future:

- With a single login, SCALAR's AI-powered assistant will take all your orders and automatically transform them into the best possible combination of vehicles, routes, drivers and loads by calculating myriads of variables based on live, actual circumstances.
- You can choose to control certain aspects, or ask it to execute the recommended schedule, automating everything from dispatching, maintenance, customer notifications, and more. In case of an unexpected change, it will recalculate and apply the best possible fix in a matter of seconds.
- Thanks to its unique quality of data, world-class



algorithms, and self-learning capabilities, SCALAR will make your fleet smarter and more efficient every day – from preventing breakdowns or cargo damage to effortlessly complying with hours-of-service while minimizing empty miles, and everything in between.

All this under one simplified and unified experience. Where real-time means real-time, scalable means unlimited, and user-friendly means “as-easy-as-googling-stuff”.

### **From fleet management to orchestration**

As the costs of owning and running a fleet increase and the industry transitions to a new era of increasing complexity, your fleet’s success today will largely depend on embracing the next generation of fleet management solutions to overcome these limitations and successfully prepare for the future. The SCALAR fleet orchestration platform is at the forefront of this innovative journey, delivering tools that combine advanced vehicle intelligence with future technologies to help you solve the massive Rubik’s cube of fleet management and stay ahead of the curve. [Read more.](#)



**Florian Modrich**  
Country Leader DACH -  
SCALAR (part of ZF Group)

# Symposium + Finale: Deutscher Startup-Pokal für Smart Logistics & Production 4.0

Join us on November 6, 2024, at BASF Coatings GmbH to discover groundbreaking innovations and engage in dynamic discussions on the future of logistics and production. Be there as the top startups are awarded.

Look forward to participants such as:



**Agnes Bührmann**  
Executive Client  
Partner Retail,  
Consumer Products  
& B2B DACH,  
**publicis sapient**



**Christoph Cramer**  
GF & BU Leiter  
Process Air  
Filtration,  
**Hengst**



**Prof. Dr.  
Diethardt Freye**  
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Components**



**Prof. Dr. Walther  
Ch. Zimmerli**  
Präsident des  
**Deutschen  
Startup-Pokals**



# Revolutionizing Material Flow: AI and Real-Time Data in Production Planning

Leveraging IoT retrofitted Lift Trucks for Seamless, Efficient, and Transparent Production Workflows

An article by IdentPro GmbH, Troisdorf



Image credits: IdentPro GmbH

**The digital twin offers real-time data that enables transparent planning processes in production-related warehouses. This allows for AI-powered decisions that optimize internal transport processes, resulting in synergy effects throughout the entire supply chain.**

Data is the driving force of our future, playing a crucial role in enhancing efficiency across all areas, including production planning and warehouse logistics. As data becomes more complex, ensuring that raw materials reach processing points at the right time and in the necessary quantities is critical for smooth material flow. Between these steps, a range of activities occurs within production-related warehouses, from moving semi-finished products to the next phase of production or relocating them to other onsite storage areas. All these processes must operate within a tight economic framework.

Logistics innovation is becoming more essential, particularly in industrial production, where the growing shortage of skilled workers adds complexity to an already intricate system. Technological advancements provide access to increasingly large amounts of data, and the goal is to continuously make the best decisions to optimize production planning. When human capacity to manage warehouse processes reaches its limits, AI steps in to transform intralogistics.

## **Harnessing Synergies Across the Supply Chain**

### *Real-Time Data for Enhanced Decision-Making*

The digital twin captures and tracks every product movement within the premises, combining this information with order details, GEO positions, and data from systems like ERP or WMS to create an integrated data packet. This data,

available instantly, helps companies make well-informed, AI-supported decisions that enhance production and transport efficiency.

### *AI at the Forefront of Decision-Making*

With larger data volumes comes greater decision-making potential. While human processing capabilities and traditional spreadsheets have their limits, AI can analyze vast amounts of information and calculate optimal processes in a fraction of the time. The AI-based system processes data from LiDAR and IoT sensors to provide real-time GEO data, creating a digital twin that mirrors warehouse activities and drives smarter internal transport optimization.

### **Unlocking the Potential of IdentPro's Warehouse Execution System:**

- Real-time localization of assets
- Highly accurate live mapping
- Ability to adapt to dynamic storage conditions
- Scan-free, paperless warehouse operations
- Reduction in unnecessary internal transports
- Efficient inventory management with minimal stock

Zero tolerance for errors, eliminating costly supply chain disruptions

### **Reducing Errors and Increasing Efficiency**

In the fast-paced world of industrial production, even minor errors can have significant repercussions throughout the supply chain, leading to delays and financial losses. However, with AI-driven automation, error rates can be dramatically reduced, offering substantial cost savings.

Where forklift operators previously had to step down from vehicles to record data manually, the new system automatically captures and corrects any errors in real time. This instant feedback helps ensure that every movement within the warehouse is tracked with precision.

### **Achieving Full Transparency with Real-Time Data**

The digital twin serves as a virtual representation of the physical warehouse, providing up-to-the-minute insights into inventory levels, conditions, and ongoing activities. This transparency enables companies to streamline processes, reduce costs, and lower their carbon footprint, all while improving inventory management, space utilization, and minimizing human errors. Paper-based processes and hand scanners become obsolete, while automated training for drivers and driverless transport systems address workforce shortages.

### **The Future of AI-Driven Production Planning**

The future of intralogistics lies in networked, AI-powered planning systems. In an ideal world, raw materials management is perfectly synchronized, but supply chain disruptions inevitably occur. These lead to delivery delays, excess inventory, and increased costs. Effective supply chain management demands complete transparency, made possible through the integration of interoperable systems.

Looking ahead, AI will be indispensable for handling the increasing data complexity. Additionally, the shift towards driverless transportation will address the growing shortage of skilled labor. As AI-based decision-making technology is already in place, the future of production planning has, in many ways, already begun.



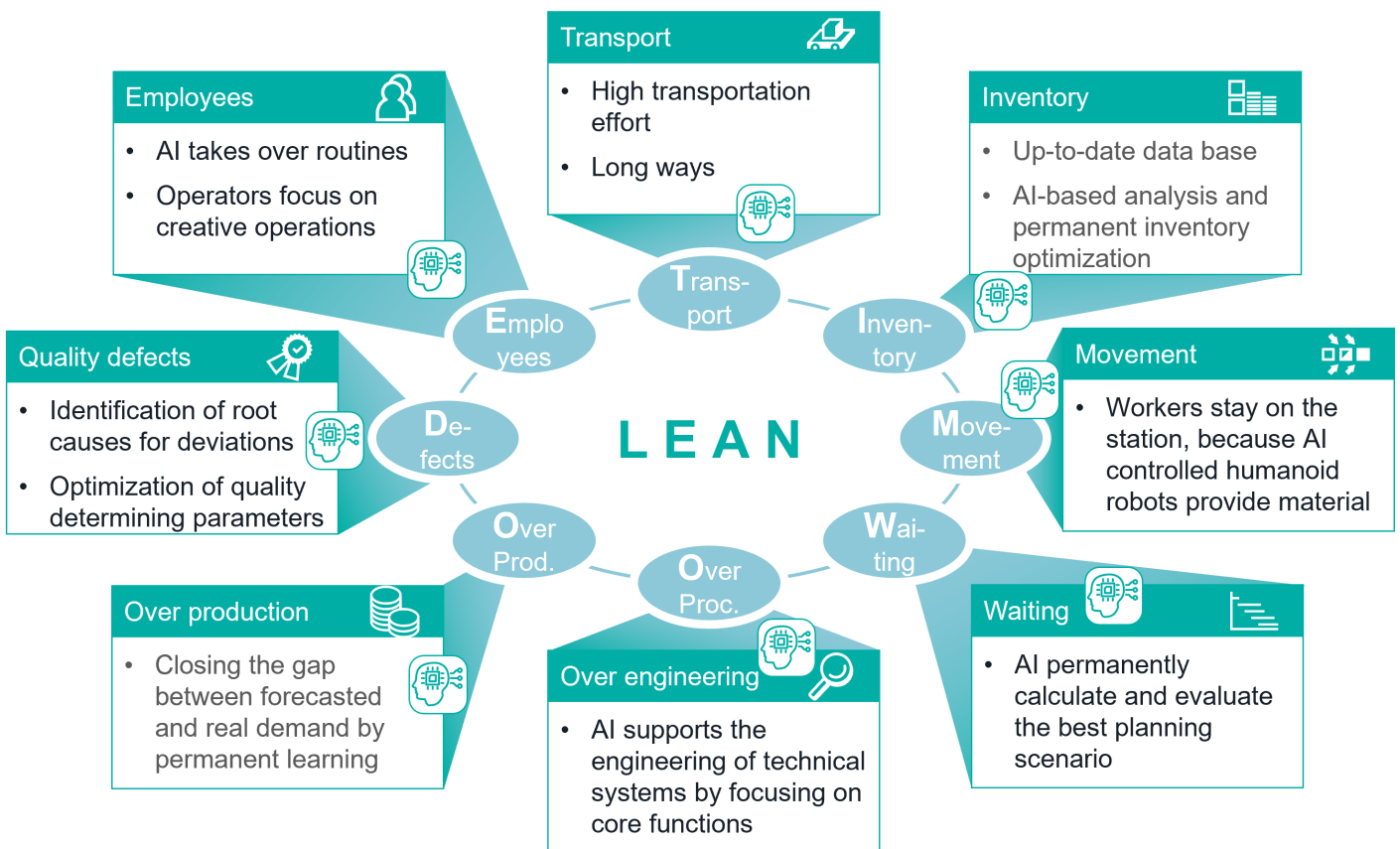
**Dr. Martin Welp**  
CEO  
IdentPro GmbH



# AI in production - Revolution or the end of the Lean Approach?

Artificial Intelligence (AI) is increasingly becoming a significant part of our daily lives, and it also offers great potentials for production systems. But does this mean that traditional methods of enhancing productivity are outdated and should be replaced?

An article by Rainer Friedland, Miebach Consulting GmbH



## Artificial intelligence – chance or risk?

AI is seen as a game-changer for production systems, dominating current discussions. Despite agreement among many manufacturing leaders, some skepticism persists. Will AI's potential outweigh its risks? Should we fully replace established methods with new ones? Will AI make Lean obsolete?

Let's clear up misunderstandings and offer some

context: AI will not eliminate Lean. Instead, AI can support all aspects of Lean, as illustrated above.

## Lean and AI – Partners in Success

### ► Transport

In the future, transport will be managed more efficiently and quickly. Autonomous transport systems, including drones, will have real-time access to trans-

port data. Continuous data analysis will enable AI to route materials to their destinations in production with maximum efficiency.

#### › Inventory

Up-to-date data combined with customer and supplier information enables continuous optimization of inventory parameters. AI learns from past shortages or excess stock, continually adjusting to approach optimal levels.

#### › Movement

Humanoid robots can support goods-to-person processes, bringing required materials directly to the workstation, allowing operators to stay in place and focus entirely on value-added tasks.

Moreover, the need for operators to leave their workstations is minimized because all information is readily available. AI delivers tailored information for each process step and workstation, specifically designed to match the qualifications of the operator on duty.

#### › Waiting time

An intelligent digital twin of the production system continuously develops optimal production scenarios. A new order is released only if AI approves its fit with the current production situation, considering existing and forecasted bottlenecks to minimize waiting times.

#### › Overengineering

AI methodologies can assist in analyzing the core functions of a technical system, reducing the risk of overengineering by avoiding the inclusion of unnecessary or potentially redundant components.

#### › Overproduction

AI is learning from both forecasted and actual demands. By using these insights, the planned production program increasingly aligns with real demand, preventing overproduction.

#### › Quality

AI assists in detecting quality deviations and their root causes early in the process. Additionally, by learning from past deviations, AI increasingly adjusts process parameters to optimal ranges.

#### › Potentials for employees

AI frees us from repetitive, tedious, or harmful tasks, allowing operators to fully utilize their creativity in daily production and ongoing system improvements.

#### Conclusion

To conclude, it is clear that AI won't replace all our successful concepts from the past decades. Notably, the Lean approach remains relevant and will actually benefit from the capabilities brought by Artificial Intelligence.

The vast new capabilities will not make our experiences and improvements obsolete. Instead, AI and Lean work well together. The principle "Processes first, IT second" still applies. First, enhance your processes; this sets a solid foundation for further improvements with AI.

By combining Lean methodology with AI solutions, Miebach supports production companies in developing and enhancing improvement concepts.

Get in touch with us to unleash the full potential of your production value chain!



**Dr. Reiner Friedland**  
Manager Production  
Miebach Consulting GmbH



Today at 3.30 pm: Robotics as a driver of logistics'

# Have we reached the pinnacle of digitalization and increased efficiency in order picking warehouses with autonomous robots? No. Here come the digital twins.

by Markus Schlotter, Managing Director Central Europe, Exotec Germany

A few weeks ago, I read the headline in the programme of the GFFT symposium: '3.30 pm: Robotics as a driver of logistics'. This reminded me of a trade fair from about years ago. During a panel discussion on challenges in intralogistics, someone from the audience interjected: "We must finally put robotics at the top of the agenda as a driver of logistics." The words were obviously prescient, but, very few people seemed to take him seriously.

## More than a niche existence in the blind spot of order picking warehouses

I am therefore pleased that on November 6, 2024 the GFFT Symposium will be specifically diving into this topic at a perfect time, just before the award ceremony. The timing is symbolic, it shows that the organisers know that robotics is finally transcending a niche existence in the obscurity of order picking warehouses.

The symposium will confirm the following: Robotics has arrived where it belongs - in the spotlight of decision makers who want to know:

- How innovative robotics technologies fit in our medium and long-term plans?
- How up-to-date do we need to continue running successful operations??

## Let the robots have a go

The past five years have shown that innovative companies embrace big changes, especially in intralogistics space. The traditional approach of having people move through the aisles, on foot or a forklift truck, to laboriously collect customer orders is just no longer tenable for high-performance organizations. Instead, today's motto is: let the robots do the manual work that fewer and fewer people are willing to do.

Exotec's proposed solution is a warehouse concept consisting of shelving, mobile robots, picking stations and conveyor technology. The robots (Skypod robots) are designed to pick up load carriers with a weight of up to 30 kilograms. They can climb up to twelve metres high on the shelves and transport the requested goods to the picking station, where a warehouse employee takes the order over the finish line; the rest is returned to the shelves, completely autonomously.

## Scalable at any time

One of the major advantages of warehouse automation by Exotec is scalability. Additional robots can be integrated into ongoing operations at peak times to reinforce the fleet with minimal

efforts and in a matter of minutes. Additional racking and picking stations can be installed without significantly disrupting the warehouse processes. While the picking robots carry out their daily work unperturbed, the warehouse operator increases its capacity as required.

#### **No extra costs: 'digital twin sits at the table'**

This makes the Exotec warehouse extremely flexible and future-proof. But that's not all. When Exotec consultants and customers design new installations, you can make use of the digital twin technology - at no extra cost. One of the key benefits of having a digital twin for your warehouse is the ability to test any new plan, process adjustment, or 'what if' scenario within the digital environment. Using the warehouse's original software, you can validate, reject, or refine ideas without disrupting physical operations - everything remains a simulation. Once the digital twin confirms success, we can seamlessly apply the changes to the actual warehouse processes. At the GFFT Symposium visitors can find out what this looks like – at the Exotec booth. We also see robotics as a driver of logistics – and not just in the afternoon at 3.30 pm, but throughout the day, every day.



**Markus Schlotter**  
Managing Director Central Europe  
Exotec Germany GmbH



# Can your supply chain manage the unexpected?

When it comes to global supply chains, risks are inevitable. But how resilient is your network in the face of unforeseen disruptions? A global FMCG leader recently faced this challenge, uncovering a significant need for enhanced transparency and standardized processes across its sprawling operations.

An article by Tim Wagner and Daniel Simon, Miebach Consulting GmbH

## Global Vulnerability Assessment Tool Vulnerability Assessment for DCs

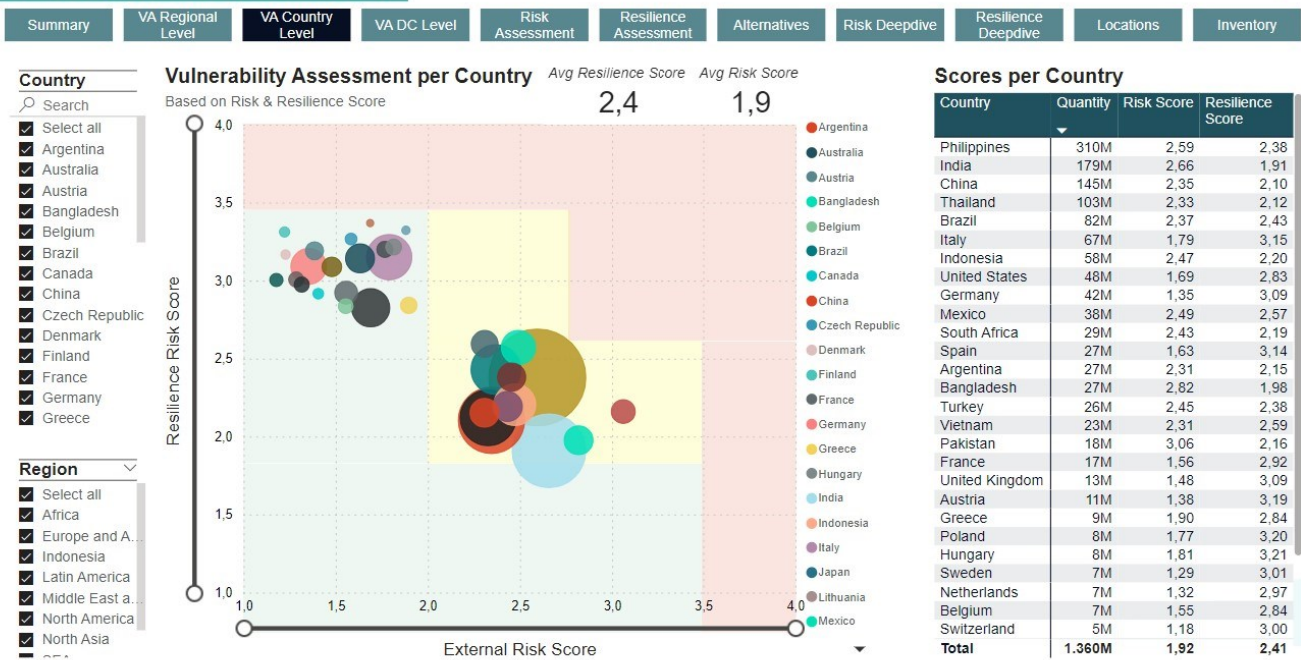


Image credits: Miebach Consulting GmbH

The term “resilience” has emerged as a dominant concept in the past years. In the light of recent events, also known as “black swan events”, many companies have placed a renewed emphasis on this issue. Following the events of 2020, the Suez Canal Blockage and other unforeseen disruptions, professionals worldwide have been forced to confront the stark reality that most supply chains lack resilience to withstand unexpected events. This

not only incurs significant costs, but the delays also have a considerable impact on customer satisfaction and numerous other aspects. One of our clients, a leading global FMCG player, with over 100 warehouses across more than 20 countries identified that its resilience strategies were fragmented, lacking clear documentation, and global standards. Without a unified plan, managing risks and disruptions became a challenging task. The

**company required more than just a fix - it needed a complete overhaul of how resilience was handled across its network.**

Miebach built a solution which not only addressed the immediate gaps but also provided a future-proof framework. Working closely with the client, Miebach developed a customized tool able to visualize and assess risks across the entire network, offering a standardized, data-driven approach.

#### **A tailored solution for a complex problem**

The solution was centered around transparency, a critical enabler for resilience in ones' supply chain. Miebach chose and developed a PowerBI-based tool that provided insights into external risks (e.g., political stability or environmental threats) and internal resilience. Deriving insights from open-source indices and client data, the tool offers a detailed evaluation of each warehouse's vulnerability, helping the company understand where its weaknesses lay and how to address them. In addition, Miebach established a global governance structure. This comprehensive framework ensured that all regions and teams were aligned, providing clear roles, responsibilities, and decision-making processes for managing disruptions most effectively.

#### **Lasting resilience**

The client's new centralized, digital database now offers an overview of the company's global resilience status. The governance blueprint ensures consistency in resilience strategies, making it easier for the company to react swiftly to disruptions. The solution not only fixes today's issues but also prepares the company to face tomorrow's challenges with a proactive approach.

#### **Looking forward: What does this mean for your supply chain?**

As supply chains grow more complex, resilience isn't just about reacting to crises—it's about being

ready for anything. The FMCG giant's journey shows the importance of transparency, standardized processes, and collaborative solutions. By adopting a tool-based approach, they've ensured that their network can adapt and thrive, even in the face of uncertainty.



**Tim Wagner**  
Senior Consultant  
Miebach Consulting GmbH



**Daniel Simon**  
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# Supplier innovations for the public sector

How can public procurement tap into the innovation potential of the industry and private sector to become more efficient and future-proof?

An article by Hendrik Bangert and Michael Eßig, Purchasing and Supply Management Research Group, Bundeswehr University Munich, Neubiberg, Germany

Image credits: OpenAI's DALL-E



**Public procurement, representing an annual volume of approximately 350 billion euros per year in Germany alone, has immense potential to drive innovation. Yet, traditional procurement processes often overlook the private sector's innovative capabilities. Public institutions, tasked with meeting growing societal demands, frequently miss out on cutting-edge solutions that could enhance their services and operational resilience. Private sector suppliers offer advancements that could revolutionize public service delivery. However, bridging the gap between public needs and private solutions remains a significant challenge, due in part to complex regulations, cost-focused procurement practices, and limited early engagement with innovative suppliers. Innovation intermediaries could help connect these worlds.**

Public institutions face growing demands from society, including the need to address complex challenges such as climate change, digital transformation, and various crises (e.g., cyberattacks, COVID-19, the war in Ukraine). These challenges

require not only incremental improvements but also groundbreaking solutions that can improve the quality and efficiency of public services. To meet these demands, the public sector must actively seek innovative products, services, and technologies, which often come from the private sector. Innovative suppliers offer solutions that can enhance public services by introducing new technologies and processes, thereby increasing the resilience and adaptability of public institutions. This collaboration is essential, as it enables governments to leverage solutions that they may not have the resources or expertise to develop internally. Estonia's e-Government system is a strong example of such a supplier-induced public sector innovation, allowing citizens to efficiently handle almost all public services, including online voting.

However, public procurement is governed by complex regulations designed to ensure transparency and fairness, frequently leading to organizational buying behaviors that can make it difficult for innovative suppliers, especially small and medium-sized enterprises (SMEs), to participate. Suppliers often encounter stringent pre-qualification requirements, extended lead times for financing, and a strong emphasis on cost minimization, prioritizing the lowest price over innovative potential. Information asymmetry also poses a challenge, as public buyers often lack sufficient knowledge of the supply market and

do not regularly engage with suppliers. This limits their ability to fully understand and evaluate the potential of advanced solutions. Moreover, the risk-averse nature of the public sector, combined with short-term budget cycles and difficulties in scaling innovation across dispersed public organizations, can constrain strategic approaches that could foster innovation. To unlock this potential, public buying behavior needs to become more flexible and engage suppliers early on.

### **Innovation Intermediaries as a practical solution**

In this regard, innovation intermediaries are a promising tool for bridging the gap between public institutions (innovation seekers) and suppliers (innovation providers). These organizations play a crucial role in overcoming barriers that prevent effective collaboration and the integration of innovative solutions into public procurement processes. As connectors, intermediaries manage the complexities and reduce information asymmetries that both sides face, enabling smoother communication and more efficient, innovation-driven procurement.

For suppliers, especially SMEs, innovation intermediaries offer support in navigating the complex requirements of public procurement. These intermediaries help suppliers better understand the needs of the public sector, enabling more effective communication between both parties. They also assist suppliers in accessing financing opportunities and provide training to ensure that SMEs are equipped to participate confidently in public tenders.

Efforts to establish innovation intermediaries within the European Union are already visible. These intermediaries operate in various forms across countries, either as time-limited projects or permanent institutions. For instance, KOINNO (Kompetenzzentrum Innovative Beschaffung) in Germany and IÖB (Innovationsfördernde Öffentliche Beschaffung) in Austria help both public

buyers and private sector suppliers reduce entry barriers and provide extensive support in the public procurement process. In countries like Italy and Greece, intermediaries are integrated into public procurement agencies, streamlining processes to foster innovation.

United Innovations itself also acts as an innovation intermediary, connecting universities and companies to foster the exchange of knowledge and expertise. This collaboration enhances the visibility of innovations and facilitates their implementation.

### **Conclusion**

By promoting knowledge exchange, lowering entry barriers, and enhancing communication, intermediaries can transform public procurement into a driver of innovation. This shift would benefit both public services through the adoption of cutting-edge solutions and private suppliers by offering greater access to public procurement opportunities.



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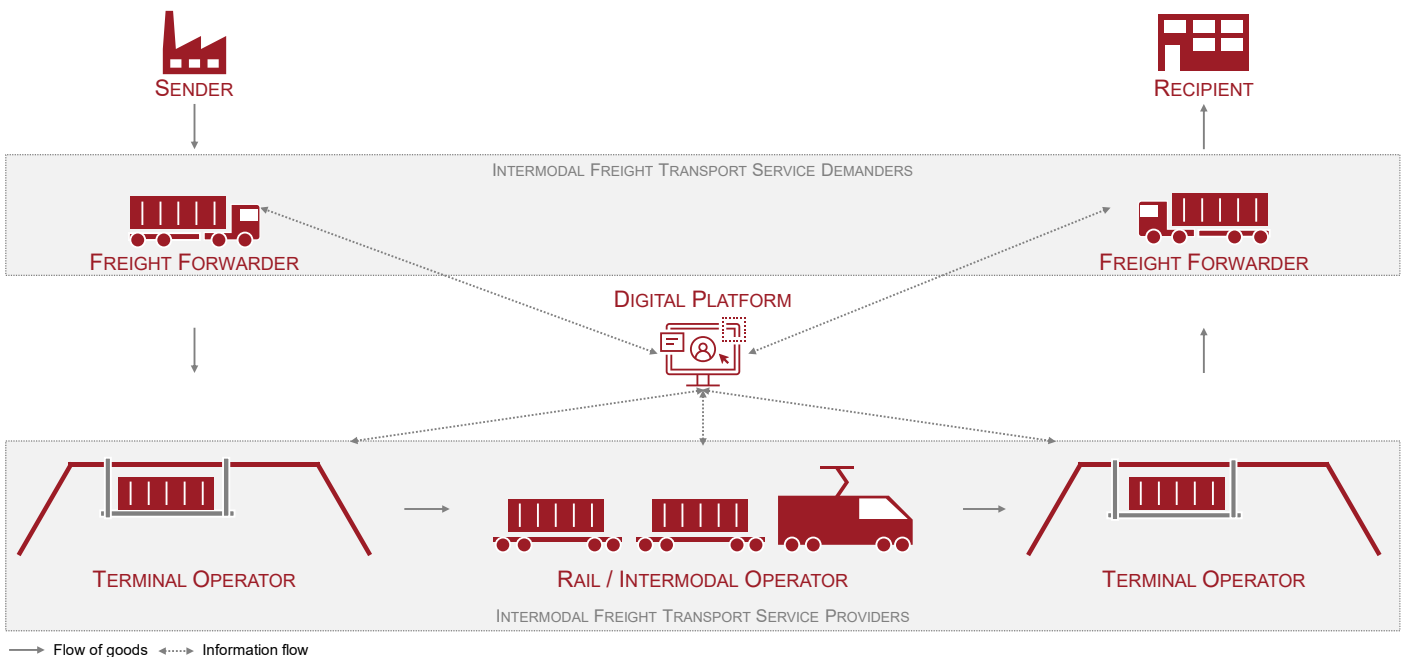


# How digital platforms support the transition to sustainable freight transport

In light of the European Green Deal, which aims at reducing transport emissions by 90% until 2050 [1], greener modes of freight transport gain relevance. Intermodal freight transport can help decarbonize supply chains by combining flexible road transport with sustainable rail transport. However, combining multiple transport modes increases complexity. Emerging digital platforms aim to address this challenge, as an interview study by the Technical University of Darmstadt revealed.

An article by the Chair of Management and Logistics, Technical University of Darmstadt

Image credits: Technical University of Darmstadt



By conducting the first and last mile of freight transport by road and shifting the main haulage to rail, intermodal freight transport can reduce greenhouse gas emissions. However, it also involves additional stakeholders, such as rail, terminal, and intermodal operators. 24 interviews with these stakeholders, as well as freight forwarders, consultants, and software firms, paint a diverse

picture of which platforms are emerging and how the intermodal market participants perceive them.

## Digitizing communication through platforms

For many years, manual data exchange through telephone, e-mail, or even telefax has dominated the communication between stakeholders of

intermodal transport. To automate and standardize this data exchange, various stakeholders have recently started to develop digital platforms that connect the providers of intermodal freight transport services (such as rail operators, terminal operators, or intermodal operators) with freight forwarders demanding these services. However, the emerging platforms are launched not only by fully digital software firms, who establish themselves as third-party intermediaries between transport demanders and providers. Platforms are also launched by incumbent freight service providers with a long operating history in the intermodal market that have started digitizing their brick-and-mortar freight transport business through digital platforms. With this abundance of different platform providers comes platform specialization: While some platforms focus on being additional sales and sourcing channels for their users, others position themselves as tools for digitizing and automating data exchange in existing business relationships. This is why the research project “ConnectedKV” reveals different perspectives on using these platforms. Further details on this project and other related projects such as “DataKV”, which investigates the requirements of a data space for intermodal freight transport, can be found on the website of the Chair of Management and Logistics at the Technical University of Darmstadt [2].

### **Perspective of intermodal freight transport service providers**

From the perspective of intermodal freight service providers, digital platforms are primarily seen as tools to increase operational efficiency and create an additional sales channel. However, the price transparency provided by third-party platforms enables platform users to compare offers of different service providers easily. This transparency creates competitive pressure, which incumbent service providers try to circumvent by launching their own platforms. Such in-house platforms can

serve as exclusive sales channels or even as mandatory tools that the service providers’ customers must use to exchange data with the service provider. While platforms such as box2rail or Contargo COLA are examples of digitized sales channels, Community Systems such as DAKOSY at the Port of Hamburg or Portbase at the Port of Rotterdam are examples of data exchange platforms launched by incumbent service providers.

### **Perspective of intermodal freight transport service demanders**

As the demanders of intermodal freight services, freight forwarders face different challenges. Their first hurdle is not the platform itself. Rather, it is the complexity of intermodal freight transport that discourages freight forwarders since intermodal transport requires specialized transport equipment (e.g., craneable semi-trailers) and knowledge that many, especially small forwarders, do not have. Third-party platforms, therefore, offer appreciated tools that freight forwarders can use to get an overview of the intermodal services offered and their prices. Moreover, an easy booking process that platforms like modility or Rail-Flow claim to make it as “easy as online shopping” lowers the barriers. However, with a growing number of proprietary platforms from intermodal service providers, freight forwarders face increasing efforts to maintain interfaces between their IT systems and those of the service providers. This is where third-party platforms that focus on automating data exchange come into play. Platforms such as catkin or DX Intermodal claim to standardize and automate data exchange between the stakeholders involved.

### **Perspective of software firms**

Purely digital software firms that provide third-party platforms find themselves caught between the requirements of intermodal service providers and service demanders. As shown above, freight forwarders appreciate a straightforward and



transparent booking process, while incumbent service providers counter these third-party platforms with their own platforms. The resulting lack of a large customer base currently limits the portfolio of services offered on third-party platforms, making it difficult for these platforms to attract new users and scale quickly. Nevertheless, the software firms believe that their platforms are an integral part of the future intermodal freight transport market, as a significant shift towards more sustainable freight transport cannot be achieved without increasing the attractiveness of the market through digitization and automation. Some even conclude that they can revolutionize the intermodal freight transport market by creating a significant added value for all users, whether they are demanders or providers of intermodal freight services.

## Conclusion and outlook

As the different perspectives show, the landscape of emerging platforms for intermodal freight transport is as diverse as the opinions about them. However, there are also points on which all interviewees agreed: The digitization of the relatively conservative transport industry is overdue, and digital platforms are readily available to address this issue. Even though many stakeholders in the intermodal freight market still have – sometimes irrational – reservations about digitization, the number of firms actively addressing the need for digitization is growing. Intermodal industry consultants agree with software firms that digital platforms are an essential cornerstone for increasing the use of intermodal freight transport as a way to decarbonize supply chains. Some even expect digital platforms to evolve from tools that support intermodal freight operations to key market players offering integrated door-to-door transport services. Consequently, investigating these developments qualitatively and quantifying the effects of adoption barriers and drivers on ac-

tual platform adoption are relevant research fields that could be subject to future studies.

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# Pioneering innovations in sustainable Logistics

Bridging the gap between academic insights and practical industry solutions is key to the global shift towards more efficient and eco-friendly logistics practices.

An article by Kühne Logistics University



Image credits: KLU/Christin Schwarzer

**KLU has long been a leader in shaping the future of logistics through its cutting-edge research and dynamic academic programs. The foundation of its new „Entrepreneurship & Innovation Center”, dedicated to promoting sustainable practices in logistics, marks an exciting evolution in KLU’s mission to drive sustainable supply chains and green logistics forward by building bridges between excellent academics and the industry.**

This initiative for the new center is driven by KLU’s commitment to contributing to the global

shift towards more efficient and sustainable logistics practices. By linking students with industry leaders and empowering the digital and green transformation of the logistics sector, the center will play a crucial role in shaping the industry's future.

Key activities within the center will include startup incubation and acceleration, providing early-stage startups focused on sustainable logistics solutions with mentorship and resources. Educational programs, including specialized courses



and workshops, will integrate entrepreneurial skills with logistics management knowledge, providing corporations with a valuable talent pool.

Innovation challenges and hackathons will stimulate creative problem-solving and offer corporations insights into emerging trends and technologies. Networking events will facilitate connections between students, alumni, industry experts, and investors, creating valuable opportunities for collaboration.

To achieve this mission, the work of KLU's new center will follow several strategic objectives

First and foremost, KLU aims to elevate its status as an AACSB accredited university, recognized for its significant contributions to sustainable logistics innovation and management education. This enhanced reputation offers corporations increased visibility and opportunities to associate with cutting-edge advancements.

The center will also focus on attracting and retaining top talent by providing practical, real-world applications and support for entrepreneurial ventures. Corporations on the other hand will gain direct access to a pool of skilled individuals and emerging ideas, enabling them to harness new innovations and drive their own strategic goals.

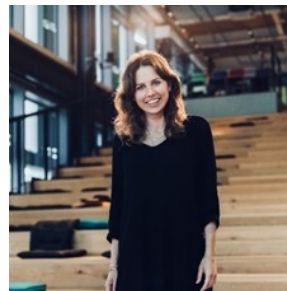
Another key objective is to strengthen industry connections by serving as a vital link between students and corporate partners. This will facilitate collaborations that drive industry transformation and ensure that future professionals are equipped with the skills necessary to tackle contemporary challenges in logistics.

Promoting sustainable practices is central to the center's mission. Through collaborative research and development projects, KLU aims to advance solutions in sustainable supply chains and green logistics. Corporate partners will have the opportunity to engage in these projects, aligning their operations with global sustainability goals and

gaining early access to innovative technologies.

Finally, research and development projects will enable corporations to partner with KLU on cutting-edge initiatives in sustainable logistics, aligning their strategies with the latest advancements and contributing to the future of the industry.

In conclusion, Kühne Logistics University's Entrepreneurship & Innovation Center is poised to be a transformative force in sustainable logistics. By establishing itself as a hub for innovation, scouting global advancements, and fostering international collaborations, the center will offer unparalleled opportunities for corporations to engage with the forefront of logistics transformation and contribute to a more sustainable future.



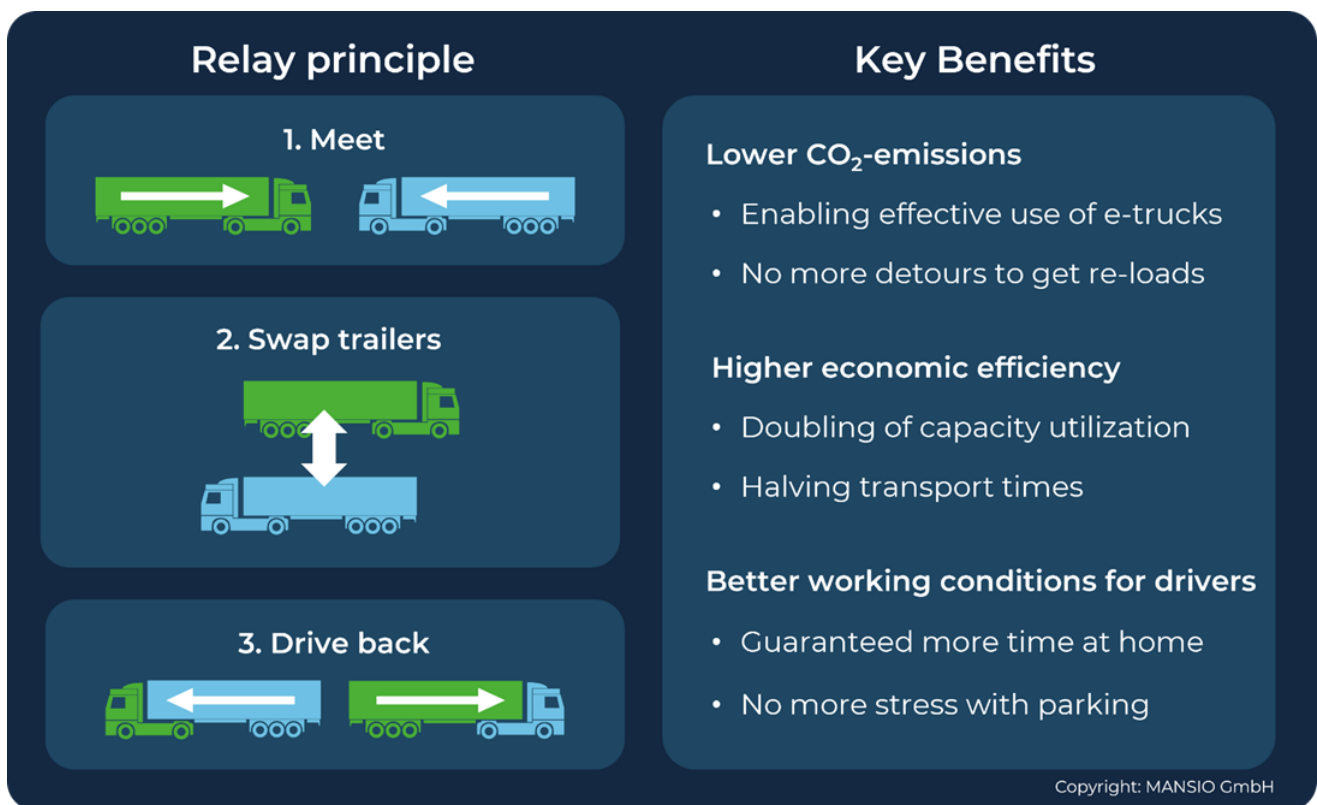
**Mariella Sinderhauf**

Head of Entrepreneurship & Innovation Center  
Kühne Logistics University

# MANSIO enables e-trucks on long-hauls

Long-haul trucks are usually fossil-fuelled. Additionally, truck parking makes long-haul transportation uneconomic and unattractive for drivers. MANSIO's IT solution improves this situation. The Aachen-based company uses the concept of relay traffic for its software.

An article by MANSIO



The sight of crowded truck stops is familiar to anyone on the highway. The mandatory 11-hour rest period for truck drivers dictates the pace of standstill. These are conditions taken for granted. For the startup MANSIO, this was the starting point in 2022 to rethink truck transports in European long-distance traffic - that is, distances exceeding 300 km.

The business idea is based on the concept of relay traffic. In this process, the semi-trailer is swapped from one truck to another at a parking lot along the route. After this trailer exchange, the truck drivers return to their home region with their own tractor-unit but a different trailer.

Today, relay traffic mainly occurs in static line traffic - according to fixed schedules similar to bus services. The same routes are served every day. The providers are primarily large logistics companies. Given the fixed scheduling, they have to accept the possibility of trucks running only half full.

MANSIO provides the necessary transparency to relay traffic with its IT solution and equips it with the required intelligence for widespread, cross-company use. To achieve this, the startup has developed a digital transport system based on a complex optimization algorithm and AI. Various data, including vehicle, location, shipment, and

transport order data, are incorporated. Combined with other parameters, the algorithm determines daily which haulage company will operate on which route and where relay traffic is economically and ecologically viable. This sets the stage for dynamically organizing relay traffic.

#### **Economically: Entry into two-shift operation**

Especially in the medium-sized freight forwarding industry, the digital MANSIO platform opens up new opportunities for interregional cooperation with many synergies that individual companies cannot achieve alone. The concept allows small and medium-sized companies, for example, to enter into an economically viable two-shift operation. The trailer is swapped after a maximum of four and a half hours of driving, and the driver returns within the allowed driving time with a trailer loaded for the region. A second shift can follow. This allows for additional revenue generation. In addition, empty runs are avoided because matching eliminates the need to travel for return trips.

#### **Ecologically: E-trucks in long-distance transport**

Especially considering the increasing costs of investing in trucks with alternative drives (like e-trucks), higher profitability for operations is essential. The investment costs for a vehicle with a clean drive amount to around half a million euros. Furthermore, long-distance battery electric trucks currently lack range and charging infrastructure. By breaking down long distances into segments, MANSIO provides a solution for how electromobility can be used in this segment today. This provides a perspective on how long-distance transport can contribute to reducing CO2 emissions.

#### **Social: No more sleeping in the truck**

MANSIO also addresses the issue of driver shortage. In Europe, there is a shortage of about 400,000 truck drivers. By allowing drivers to be home after their shift instead of searching for overnight parking, the startup improves working

conditions, making the profession more attractive - even for women, who currently make up only two percent of the profession. Additionally, the concept relieves infrastructure, as a calculation example shows: if 25 percent of parking operations were eliminated through trailer swaps with the MANSIO system, the shortage of parking spaces could be solved without further construction of new truck parking lots.

Since summer 2023, MANSIO has been cooperating with the cargo network Elvis. Its managing director, Jochen Eschborn, is convinced: "MANSIO is groundbreaking technology that will lead logistics into the future." Since March 2024, the pilot phase of the new «cross-load network» has begun. The barriers to entry for participation in digital networking are deliberately low. Onboarding for software usage is simple, and there are no fixed costs for freight forwarders, only user-based license fees.

While the concept for optimizing long-distance transport is being rolled out, MANSIO has already set its next goal. The IT service provider for logistics solutions aims to be the first to enable hybrid operation of conventional and autonomous trucks. MANSIO aims to provide the IT to control a European-wide network in which trailers are exchanged between manual and autonomous trucks.

- 50% reduction of fixed costs for trucks
- Use of e-trucks possible on long-hauls
- No more detours to get re-loads
- Truckers sleep at home, not on parking lots



**Dr. Maik Schürmeyer**  
Founder & CEO  
MANSIO GmbH

 **Detailed information in the techL profile:**  
[Mansio GmbH](#)



# Supply-side stimulus for growth

The stagnation of the German economy is entering its sixth year. The economic weakness threatens to turn into a structural crisis. Structural reforms on the supply side must be on the agenda in order to provide the necessary economic policy impetus for more growth.

An article by Prof. Dr. Hubertus Bardt, Institut der deutschen Wirtschaft



Image credits: freepik

**Economic policy faces a combination of prolonged weak growth and considerable pressure to transform. Apart from the coronavirus crisis and the subsequent recovery, the economy as a whole has stagnated since 2019. Economic policy has to react and provide the necessary supply-side reform in order to promote growth.**

The situation in manufacturing is even more critical. Many industries have not grown since the summer of 2018. The outlook for the current year does not suggest any improvement either. The manufacturing sector is even expected to see a further noticeable contraction. This long phase

without dynamic growth prospects alone is weakening companies' optimism, willingness to take risks and willingness to invest. In addition to economic and fiscal braking effects, the deteriorating quality of the location is also having an impact. While the lead in traditional strengths such as the well-developed infrastructure is declining and other locational advantages such as the availability of well-trained employees are in danger of being lost in the face of demographic change, costs in Germany have continued to rise. Taxes are very high by international standards, unit labor costs and energy costs are no longer sufficiently offset by the advantages of the location.

Insufficient investment activity is not a recent phenomenon. Investment performance was already comparatively weak in the years of the last upswing. The reduced quality of the location and the high costs are the result of years of development. A short-term economic stimulus could not eliminate the structural causes of stagnation. What is needed instead is a systematic improvement in the supply side to make investment in Germany more attractive. Conversely, such a supply-side policy program, which is in principle effective in the medium term, can also have a short-term effect. An economic stimulus can arise if investor confidence in the location increases and deferred investments are realized.

The weak investment situation and poor investment conditions are particularly critical because the upcoming fundamental change processes require considerable investment in order to at least secure existing economic activities. Companies are facing considerable investment requirements because they have to adapt their production technologies to the climate protection requirements, which will become much stricter in the coming years. This expenditure typically goes beyond the investments that are necessary anyway if climate-neutral plants are more expensive than conventional ones or if existing plants are taken out of the production process prematurely and replaced. This increases the need for investment, while only a portion of it results in an expansion of production potential and thus, has an impact on growth. However, a stronger expansion of the capital stock would be necessary in order to at least partially offset the lower growth potential due to demographic change.

To enable transformation investments, special framework conditions are required in addition to the generally improved location conditions, which must be in place to enable investments that are not economically viable on their own. This applies, for example, to the replacement of traditio-

nal blast furnaces with hydrogen-compatible direct reduction plants, which are necessary for the decarbonization of industry but are not economically viable today without appropriate funding. A clear perspective on the future regulatory framework for investment in the necessary gas-fired power plants, storage facilities and other technologies is also necessary in electricity generation.

In order to overcome the current stagnation crisis, a powerful supply-side policy boost is required. Such a program must include both the improvement of the general site conditions and the specific investment conditions for the transformation tasks. The most important measures include:

- **Reducing tax burdens:** Germany is one of the locations with the highest tax rates, well ahead of important competitors. The general qualities of the location are no longer sufficient to compensate for the cost disadvantages. A clear signal of relief, including the abolition of the remaining solidarity surcharge, is urgently needed.
- **Limiting social security contributions:** The impending significant increase in social security contributions would make the already scarce factor of labor even more expensive and represent a further increase in the current excessive cost burdens. However, the expectation of rising costs in the future is already making investment in the present more difficult. The reform of pension insurance is therefore part of an economic policy growth agenda.
- **Updating infrastructures:** Weaknesses in infrastructure are increasingly becoming a business risk. This applies to transport infrastructure, but also to energy networks and digital infrastructure. Planning and implementation of modernization and maintenance must be significantly accelerated.

- **Reducing bureaucratic burdens and regulatory density:** Companies need a clear signal that economic dynamism is desired in Germany and that investments can be made possible. The high level of regulation and increasing bureaucratic burdens send the opposite signal. The Act on Corporate Due Dilligence Obligations in Supply Chains overshadows all attempts to reduce bureaucracy.
- **Digitizing public administration:** The lack of digitization in public administration is also becoming a location risk, as processes are unnecessarily complicated and lengthy. Different systems in the various regional authorities should be reduced as far as possible.
- **AI offensive:** As a cross-sectional technology, artificial intelligence will be decisive for the future development of prosperity. The risk-oriented European regulatory approach must be supplemented by a broad-based development and implementation offensive in science, industry and administration.
- **Investment-friendly framework for the green transformation:** A stable regulatory and funding framework is essential, especially for sectors under high decarbonization pressure, in order to be able to make the necessary investment decisions in favour of Germany as a business location. Simply hoping for competitive energy prices in the future is not enough.
- **Securing financing:** Various measures such as reducing the tax burden, modernizing and expanding infrastructures or climate protection-related transformation financing must be adequately financed. To this end, efficiency potential and savings opportunities in public budgets must be realized. In addition, the existing debt regulations must be reformed appropriately. A fiscal policy that is incapable of acting due to the unwillingness to cut expenditures and tight deficit rules otherwise threatens to become a location and growth risk.



**Prof. Dr. Hubertus Bardt**  
Managing Director  
Institut der deutschen  
Wirtschaft



# United Innovations



**United Innovations supports the advancement  
of innovation in Germany.**

# Portfolio Transformation but how

A sustainable portfolio is a key feature of companies that perform well on sustainability, because sustainable products create value for the company, its stakeholders and society. But how do you get there?

An article by Merck KGaA, Darmstadt, Germany

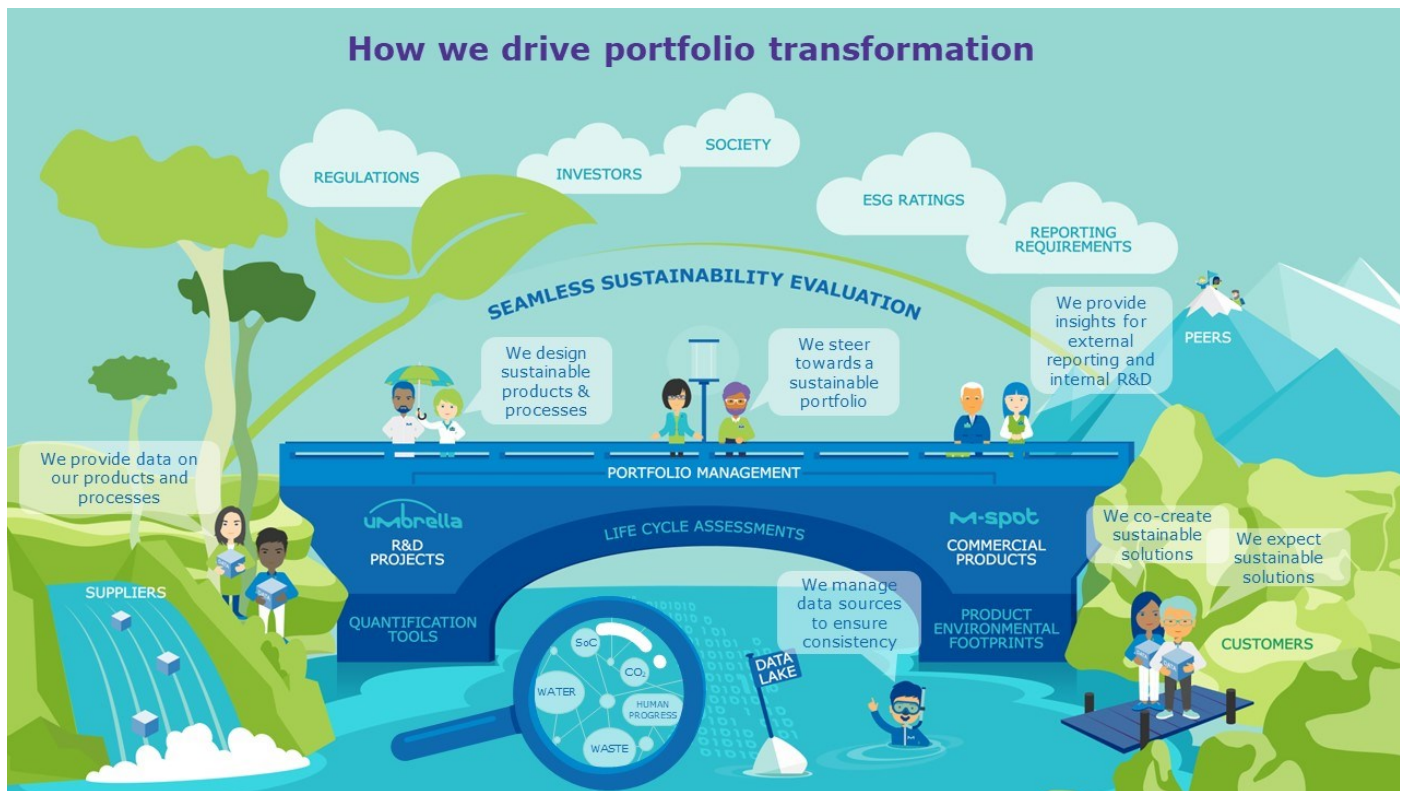


Image credits: Merck KGaA

In 2020, our company has defined its sustainability strategy based on 3 ambitious goals. The first pillar is to deliver human progress for 1 billion people by 2030 through sustainable innovations and technologies and by making a positive impact on health and well-being with our products. The second pillar focuses on fully integrating sustainability into our value chains, be it in our own processes or in our supply chain, or by providing a diverse and inclusive environment for our employees. The third pillar aims to reduce our environmental footprint. We aim to be carbon neutral by 2040 and to significantly reduce our resource intensity.

In particular, the first and third goals can only be achieved if we continue to transform our portfolio. We must ensure that our products create value not only for our company but also for society. This societal value can be created by addressing an unmet medical need with a pharmaceutical product or by providing access to healthcare in LMICs, whether in terms of accessibility, affordability, or awareness. Sustainable innovations and technologies can also address, for example, the substitution of resource-intensive materials in our products or the reduction of waste.



Our colleagues in research and development in Healthcare, Life Science, Electronics are working on projects that will reach patients and customers in 10 or 15 years' time. Anything we miss now in terms of sustainable design will haunt us in the future. A systematic portfolio transformation towards sustainability starts in R&D and needs to be steered and monitored. We have called this process Umbrella because the sustainability information about our R&D portfolio can be monitored under one “umbrella”. The business units have their own sustainability scorecards for each stage gate in R&D. The sustainability performance of our projects in relation to our targets is transparently shown in our corporate sustainability R&D dashboard. The portfolio review process checks that the various sustainability criteria are met. The criteria can be very different depending on the sector and stage of development. For example, diversity of patient population is only a criterion for healthcare projects in clinical development. Product carbon footprint and water consumption are criteria for all sectors. This type of continuous improvement of sustainability factors from stage gate to state gate will ensure the sustainability of our future portfolio. But what about the existing portfolio? We have defined different criteria for our existing portfolio. The compliance with upcoming and new regulations and increasing sustainability expectations are examples of criteria. The aim is to minimise the revenue with products of low sustainability performance and maximise the revenue with products of high sustainability performance.

As shown in the chart, the interplay between the sustainability scorecards for our R&D portfolio and the classification of our existing portfolio ensures a seamless sustainability assessment. Reliable and available sustainability data is an important prerequisite for this classification. And of course we rely on data from our suppliers, just as our customers expect us to provide them with relevant sustaina-

bility information.

It sounds simple, but there was a lot of scepticism at first. Concerns ranged from another bureaucratic hurdle to delaying our R&D progress. It was very helpful that progress in assessing our R&D and market portfolio for sustainability became part of the incentive scheme for our annual bonus programme.

Beyond these measures, our stakeholders, including our investors, expect a high level of transparency on our sustainability performance. We provide this through voluntary participation in many ESG ratings. The new CSRD, with its multiple data points, brings a further level of transparency.

We are very proud that this process of seamless portfolio evaluation and improvement is continuously delivering more sustainable products to our patients and customers.



**Dr. Petra Wicklandt**

CSO

Merck KGaA, Darmstadt, Germany



# Unlocking Sustainable Manufacturing with Data-Driven Insights

What if the key to unlocking sustainable manufacturing lies not just in advanced technology, but in how effectively you harness data to align operational efficiency with environmental impact? An article by Cognizant Technology Solutions

Image credits: Adobe generative AI image for sustainable factories



## Introduction

In today's rapidly evolving industrial landscape, sustainability has transcended from a mere buzzword to a critical business imperative. As global attention intensifies on environmental responsibility, companies are increasingly pressured to align their manufacturing processes with the principles of sustainability. But what if the key to unlocking sustainable manufacturing lies not just in advanced technology, but in how effectively you harness data to align operational efficiency with environmental impact?

This article delves into the challenges and opportunities of sustainable manufacturing, exploring how leveraging operational data and integrating smart technologies can lead to significant improvements in sustainability metrics, operational

efficiency, and profitability and how data-driven strategies can help industries achieve the triple bottom line of people, profit, and planet.

## Understanding the Core Challenges

Sustainable manufacturing is defined as the creation of products through economically sound processes that minimize negative environmental impacts while conserving energy and natural resources. However, achieving this balance is challenging. Operational inefficiencies, excessive resource consumption, and complex supply chains are just a few of the hurdles that industries must overcome.

One of the most significant challenges is the disconnect between operational efficiency and sustainability. While many companies focus on streamlining processes to reduce costs, they often overlook the environmental impact of these operations. This disconnect is particularly evident in how companies manage their resource usage - such as energy, water, and raw materials - which directly correlates with sustainability outcomes.

If you have the opportunity to visit a manufacturing facility, observe how easily production and operational metrics can be retrieved in near real time. You may be surprised to discover that sustainability metrics often require significantly more time and effort to calculate, let alone integrate into routine decision-making processes.

## Operational Bottlenecks and Sustainability

Industry findings have shown that removing operational bottlenecks correlates strongly - in some cases by over 90% - with improvements in sustainability. This correlation highlights the importance of viewing operational efficiency and sustainability as interconnected rather than separate objectives. For instance, a bottleneck in the production process that leads to excessive energy use not only increases costs but also contributes to higher carbon emissions.

A crucial question for manufacturers is: How are you leveraging operational data and sustainability data for combined optimization?

## The Power of Operational Data in Sustainability

In the pursuit of sustainable manufacturing, data is one of the most valuable assets a company can possess. Operational data, when integrated with sustainability metrics, provides actionable insights that can drive significant improvements across the board. This integration allows companies to optimize their manufacturing processes, reduce waste, and minimize their environmental footprint.

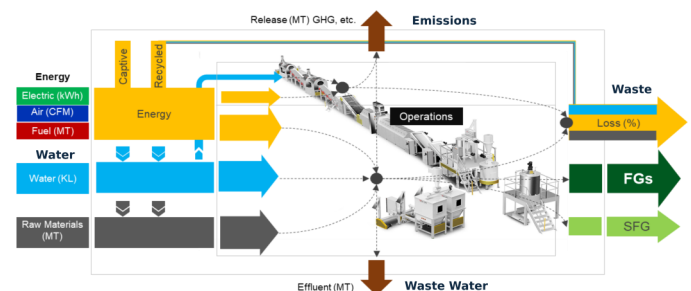
One of the key challenges is how to effectively leverage this data. Many companies collect vast amounts of operational and sustainability data but lack the tools or expertise to analyse and act on it. This is where advanced analytics or ML/AI come into play, enabling manufacturers to uncover patterns and correlations that might otherwise go unnoticed.

## Data Collection for Resource Management

Effective resource management begins with accurate data collection. Manufacturers need to gather process-specific, meter-specific, and site-specific data on resource and material inputs and outputs. This data forms the foundation for identifying inefficiencies and opportunities for optimization.

The challenge lies in the diversity and volume of data generated by manufacturing processes. Energy, water, steam, gas, waste, raw materials, and emissions data all need to be collected, analysed, and acted upon. Prioritizing which data to focus on can be difficult, but it is essential for maximizing the impact of sustainability initiatives.

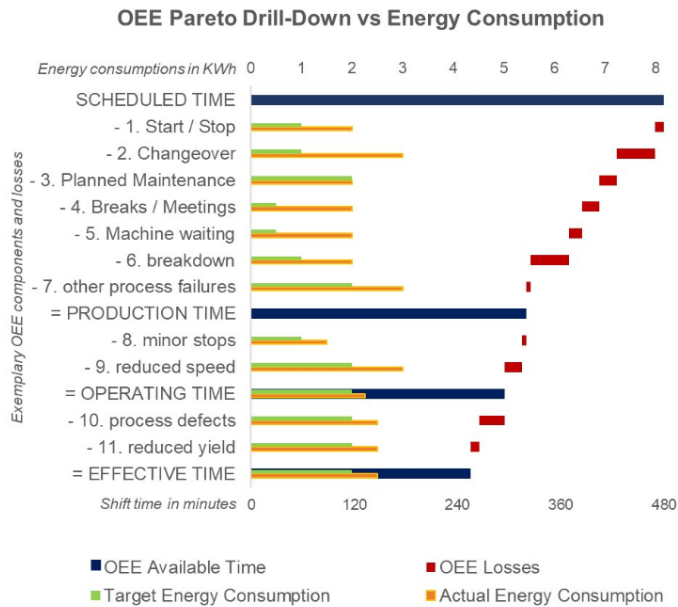
Energy and water are two of the most critical resources in manufacturing, and their efficient use is essential for both operational efficiency and environmental sustainability. Industry studies estimate that the potential for energy and water usage optimization in manufacturing ranges from 20% to 50%. This wide range reflects the diverse nature of manufacturing processes and the varying degrees of inefficiency present in different facilities.



## Example of Data-Driven Energy and Efficiency Optimization

Let's consider a hypothetical example to illustrate the impact of data-driven optimization. Suppose a manufacturing equipment has a baseline of 2 KWh consumption while producing good parts and it is running an 8-hour shift or 480-minutes. In the figure, we can appreciate how depending on the OEE losses, several spikes in energy usage occur. These can be reduced if related to wear and tear (e.g. 9. reduced speed) with proper preventive or predictive maintenance or if tool change (i.e. 2. changeover) has an unnecessary number of dry runs before being fully operational. If the machine is waiting for parts, smart start and stop mechanisms would help diminishing the energy usage as well.

As the target energy usage (green bar) differs depending on operating conditions, it is critical to look at primary consumption data (orange bars) to establish *dynamic* and accurate baselines for proper contextual analysis.



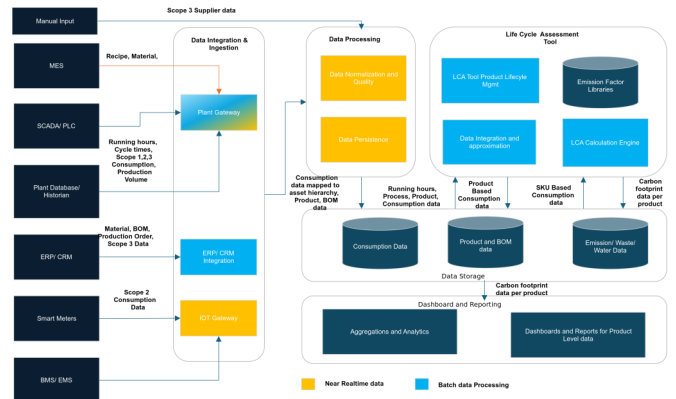
The clear advantage here is that energy savings have a direct 1:1 correlation with monetary savings and scale rapidly across multiple equipment and production line, if the symptoms of high energy usage are common in one facility.

Overlaying and analysing both production and sustainability metrics allow for synergies and savings that lean production techniques alone would not be able to achieve.

### Near Real-Time Monitoring for Continuous Sustainable Improvement

Continuous improvement is at the heart of sustainable manufacturing, and near real-time data monitoring is a critical enabler of this process. By monitoring KPIs such as energy consumption, water usage, and waste production in near real-time, companies can quickly identify deviations from sustainability targets and take To do so, we need to leverage as much as possible the existing OT/IT landscape of manufacturing operations and look for dynamic waste, emissions, energy, water,

steam, fuel and gas consumptions data to establish a proper baseline, which depends on the type of products, materials, processes operating conditions.



Often these data are scattered across a multitude of systems such as ERP, MES, SCADA, PLC, etc... so that the challenge is developing a solution architecture capable of harnessing near real time data from multiple processes and legacy systems while having the right mix of analytical expertise and ML/AI algorithms tailored to the specific product, processes and consumptions.

If performed correctly, this approach allows in time to move away from proxy or secondary data and to gather primary data that build the basis for reliable and accurate *dynamic* environmental product footprint (EPF), lifecycle assessment LCA, product carbon footprint (PCF).

For selected potential use-cases, the implementation can be approached step-by-step, focusing on the most promising hotspots within the manufacturing process. By targeting these key areas, companies can prioritize initiatives that are likely to yield the highest impact in terms of sustainability improvements. This method allows for careful monitoring and refinement of practices before broader application, reducing risks and ensuring best practices are developed.

Once these initial sustainable manufacturing lighthouse projects prove successful, they can be rapidly scaled across the organization, provided that



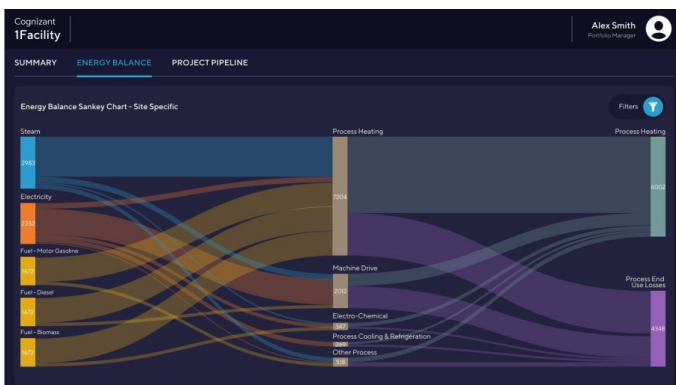
strong leadership commitment is in place. Leadership plays a pivotal role in championing these initiatives and ensuring alignment across departments. Additionally, allocating the necessary resources—both financial and human—is critical for effective scaling. This process mirrors the way global enterprises roll out large-scale initiatives, such as enterprise resource planning (ERP) or manufacturing execution systems (MES) projects, which are similarly phased, well-resourced, and strategically aligned with organizational goals. With this structured approach, sustainable manufacturing practices can become deeply embedded in operations, driving long-term value.



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Sustainability Strategist  
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Solutions GmbH



Detailed information in the techL profile:  
[Cognizant Technology Solutions GmbH](#)



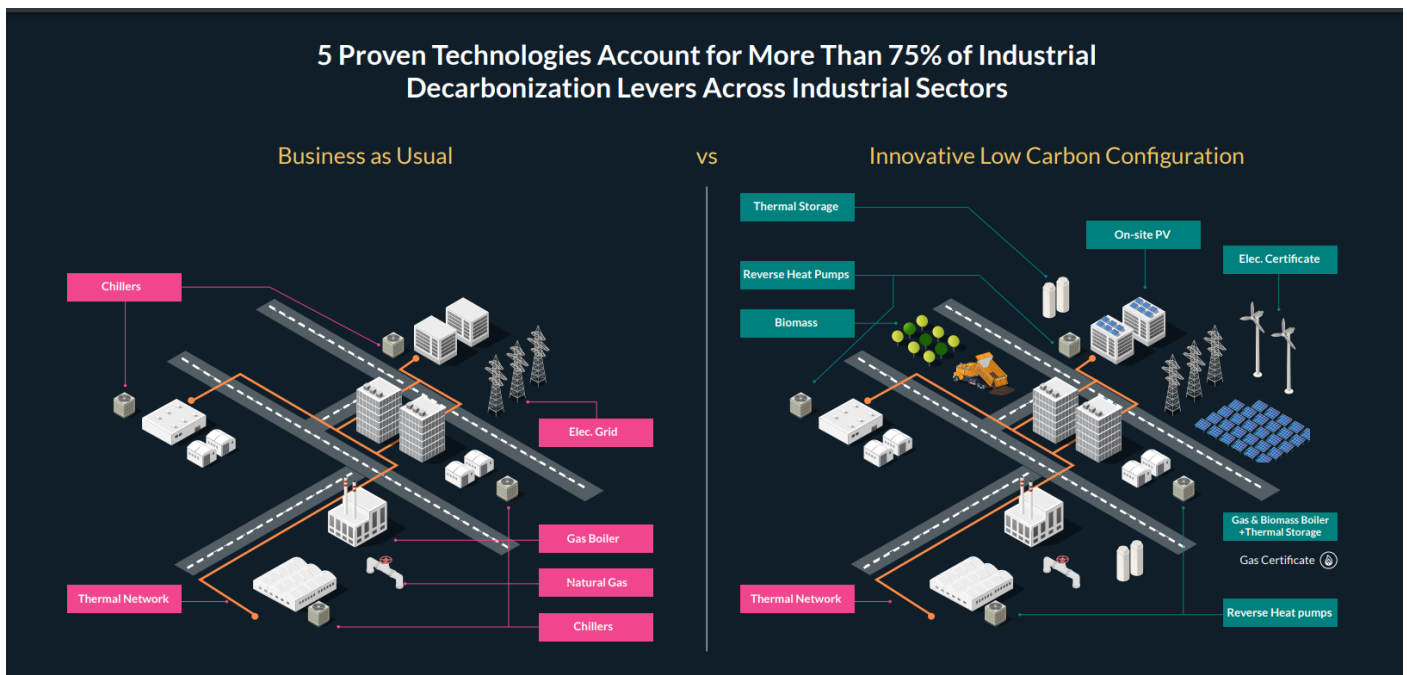
## Conclusion

Sustainable manufacturing is not just a moral imperative; it is a business necessity in today's world. By leveraging data, integrating advanced technologies, and adopting innovative approaches companies can achieve significant improvements in sustainability, operational efficiency, and profitability. The path to *sustainable smart factories* requires a commitment to data-driven strategies, continuous improvement, collaboration across the value chain, and a willingness to embrace new ideas and technologies. Those who succeed in this journey will not only contribute to a healthier planet but also secure their place as leaders in the future of manufacturing.

# Decarbonizing Manufacturing: A Net Zero Factory Approach

The race to Net Zero emissions is heating up, but many organizations are struggling to keep pace.

An article by Tobias Kueter, from ENGIE Impact



According to a recent [ENGIE Impact survey](#), only 20% of company executives say they are “meeting or exceeding” their ambitious decarbonization goals. The gap between ambition and action is particularly pronounced in manufacturing, where complex operations and energy-intensive processes make it difficult to implement meaningful changes.

First conclusion: An efficient decarbonization roadmap requires an ambitious program for implementation — otherwise there is a risk of a gap between expectations and results. As one C-suite executive lamented: "Middle managers are not executing our plan, they are doing business

as usual". The survey also shows senior decision-makers are much more optimistic about both the potential and the implementation capacity of their companies, compared to the functional and local managers who are expected to implement the changes. How can the latter be better engaged and brought along?

ENGIE Impact has conducted more than 100 studies of client sites worldwide over the past five years and developed the Net Zero Factory solution. This approach, which focuses on reducing Scope 1 and Scope 2 emissions at the site level, offers a structured framework for achieving significant greenhouse gas reductions.

Although the Net Zero Factory approach may be new to some organizations, its strategic implementation can yield substantial benefits. By proactively addressing decarbonization at the site level, companies can build resilience, reduce operational costs, and enhance their momentum toward decarbonization goals.

1. A Paradigm Shift is Needed

For most global organizations, the average carbon emissions reduction target is at least 30% by 2030. However, the sheer magnitude of the challenge makes it difficult to know where to begin, resulting in indecision and inaction.

The concept of Net Zero Factories offers a promising path toward a more sustainable future for industrial operations, with an average potential of 60% emissions reduction at site level. However, realizing the full potential of this approach requires a fundamental shift in how organizations think about manufacturing and resource management. The first step is for leaders to revisit their stakeholder expectations and emphasize that maintaining the status quo is not a viable option.

Traditional business models often focus on short-term profits and efficiency, which reduces the organization’s ability to create a proactive resilient strategy with the long-term in mind. Instead of ROI-based prioritization, the evaluation of different scenarios according to total cost of ownership (TCO) will help optimize the company’s investment strategy.

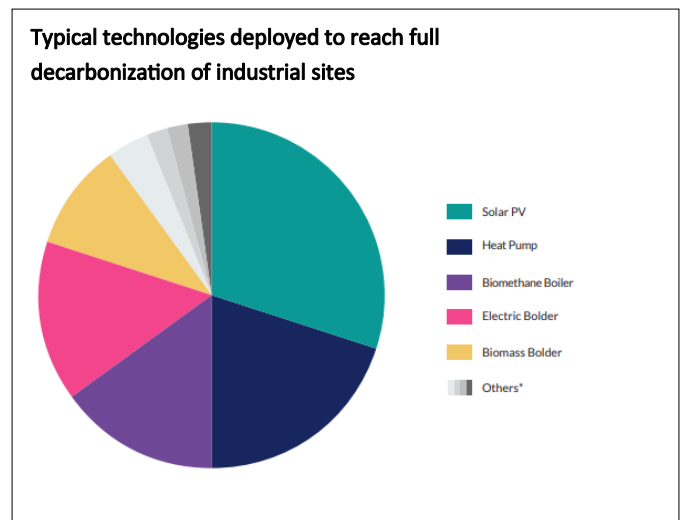
Building a site-level emission reduction pathway requires organizations to take action on the following:

- **Short-term vs. Long-term:** While immediate cost savings might seem attractive, investing in energy-efficient technologies and practices can lead to significant long-term cost reductions.

- **Innovation Adoption:** Embracing new technologies like renewable energy, energy storage, and carbon capture is crucial.
- **Collaborative Approaches:** Partnering with suppliers, customers, and industry peers can accelerate decarbonization efforts.

2. Building Resilience Through Technological Diversity

Unlike traditional approaches that evaluate technologies in isolation, Net Zero Factories take a comprehensive view of decarbonization. Investing in a diverse portfolio of decarbonization technologies can enhance an organization's resilience through increased adaptability to technological advancements and regulatory changes.



A range of proven technologies can be utilized to support manufacturing facilities in their journey to Net Zero emissions. In fact, five proven technologies account for more than 75% of manufacturing decarbonization levers:

- **Photovoltaics:** Solar panels can generate clean electricity on-site, reducing reliance on fossil fuels.
- **Electrification:** Replacing fossil-fuel powered equipment with electric alternatives can significantly reduce emissions.



- **Heat Pumps:** These devices can extract heat from the environment and use it to heat buildings and processes, reducing the need for natural gas or other fossil fuels.
- **Biomass:** Wood and other plant-based materials can be burned to generate heat and electricity, provided they are sourced sustainably.
- **Biomethane:** Produced from organic waste, biomethane can be used as a renewable fuel for heating, power generation, and transportation.

**Conclusion :** Manufacturing decarbonization is economically viable across many industries and ENGIE Impact teams work with decision-makers and site representatives to develop tailored decarbonization strategies and optimize related investments. Together, we can build a world where industrial operations are not only profitable, but also environmentally responsible. [Learn More.](#)



**Tobias Kueter**  
Senior Manager,  
Strategy & Implementation  
ENGIE Impact GmbH



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# Integrated Factory Planning in the Industrial Metaverse

Creating added value from an end-to-end Digital Twin of the entire factory from planning, through virtual and physical commissioning to operations based on the Industrial Metaverse.

An article by Drees & Sommer



Image credits: Drees & Sommer

As a result of the ongoing digitalization, new technologies and forms of collaboration have become a key factor in the digital and virtual planning of factories and industrial buildings in recent years. For the first time, the Industrial Metaverse enables a consistent database through the integration of a wide variety of systems, functions and data sources, from product development through production and building planning to ongoing factory operations. This has a significant impact on efficiency and quality in all phases and disciplines of factory planning and forms the basis for securing the start of production.

The Industrial Metaverse opens a virtual collaboration and data layer based on Digital Twins in which physical and virtual worlds merge, paving the way for a new level of maturity in industrial digitalization. This is enabled by the continuous development and convergence of a variety of key technologies such as Cloud and Edge Computing, Industrial Internet of Things, Extended Reality or Artificial Intelligence. Previously isolated data pipelines and Digital Twins of physical assets and processes can be integrated into a central layer. The overall goal is to fully integrate the current physical state of the entire factory into a virtual environment and visualize it in real time,



thus creating the basis for assisted and data-based factory control.

Drees & Sommer's integrated factory planning approach in the Industrial Metaverse pursues the development of an end-to-end Digital Twin of the entire factory, from planning through virtual and physical commissioning to operations. The development of an integration and collaboration layer in the context of the Industrial Metaverse enables interdisciplinary and real-time collaboration between different disciplines and stakeholders during the planning phase of a factory. This approach serves to seamlessly integrate experts from different areas, such as product development, process and production planning, and building and infrastructure planning, into a shared virtual workspace. Furthermore, thanks to the consistent and transparent database, all stakeholders always have the same level of information.

A practical example: planners, engineers and external suppliers have the opportunity to collaborate in virtual planning sessions and solve critical interface issues always based on a consistent and transparent data basis. In addition to shortening the planning period by increasing efficiency, this also leads to a noticeable improvement in the quality of planning thanks to early interface analyses and the identification of optimization potential in the context of the entire factory.

In addition, technology convergence in the Industrial Metaverse enables the parallelization and merging of engineering, simulation and virtual commissioning by creating and maintaining a continuous Digital Twin. The data generated from the planning process and the virtual commissioning serve as the basis for the transfer to the operating state as well as the integration and connection of data sources from the shop floor.

The introduction of an integration and collaboration platform for a centralized process, stakeholder

and data management also brings another advantage: the optimization and streamlining of the very heterogeneous system and process landscape that has grown over the years, through targeted embedding of expert functions in the integration layer.

Developing your own Industrial Metaverse ecosystem requires adaptations to your own applications and system landscapes. Drees & Sommer supports you on your way with customized solutions and approaches - from the conception and implementation of pilot projects to the technical rollout and the realization of the next generation of digital factories in the Industrial Metaverse.



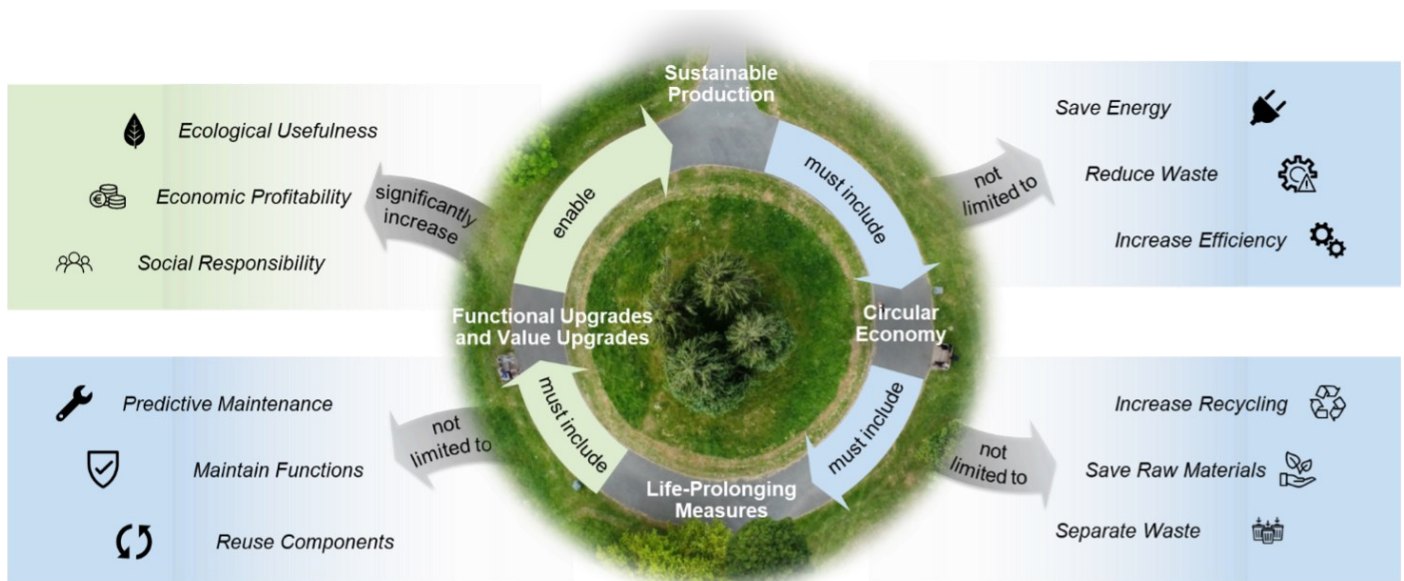
**Tobias Stempfle**  
Consultant  
Drees & Sommer

# Upgrade Circular Economy for Sustainable Production

How will the future value creation business look that is sustainable, resilient, and profitable at the same time?

An article by the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University

Image credits: RWTH Aachen



The production industry is confronted with a significant challenge: How to simultaneously enhance sustainability, resilience, and profitability? This is to fulfill regulatory and societal requirements, adapt to disruptions in the global supply chain, and maintain a competitive advantage in an increasingly volatile market. One approach to overcoming these challenges is the Upgrade Circular Economy, presented in this article.

Producing companies are increasingly facing challenges that threaten their profitability, resilience, and sustainability. These three factors are critical to maintaining long-term competitiveness. To become future-proof, companies need to reduce their dependence on supply chain bottlenecks and adopt sustainable business models.

Efforts to achieve sustainable production should go beyond simple energy-saving measures or waste segregation; they must embrace a circular economy approach that enhances product longevity, functionality, and value. By pursuing this goal simultaneously, companies can build resilience and ensure long-term success and profitability. However, this is a challenging task.

One promising approach is the Upgrade Circular Economy (UCE). This refers to the distribution of modular products that are regularly reassembled and remanufactured by the producing company to extend their life cycle and equipped with product upgrades to remain attractive in the customer market. In this way, continuously improved products are created in circular systems.

The sustainability of production is significantly improved via the circularly planned product life cycle by enabling the targeted upgrade of used components and materials and thus also reducing the need for new materials. It also reduces the amount of energy needed to provide products, resulting in significantly lower CO<sub>2</sub> emissions.

Furthermore, this increases the profitability of production. Compared to conventional product development and production processes, industrial reassembly enables products to be produced with fewer new materials and process steps, which at the same time remain competitive in the market due to the upgrades. Fewer steps in the process to deliver products while requiring less resource investment by companies result in higher profit margins that make UCE economically desirable - Doing more with less!

Resilience can be increased through circular material flows, reducing dependency on external material availability and suppliers. UCE achieves a significantly higher number of suppliers as every customer is a supplier of used parts. This means that a company is less dependent on fluctuations in the availability and price of energy and materials. Unlike linear economies that expand capacity or use stockpiling to deal with variances, UCE provides greater process flexibility to adapt to disruptions. With immediate planning of linear and circular material flows serving regional service locations, disruptions can be localized and addressed systematically. The modular process design allows existing production resources to be flexibly reorganized to respond to changing customer requirements and economic material availability.

But UCE is no longer just theory. An exciting realization of this approach is the production concept of e. Volution GmbH, a company close to the Chair of Production Engineering at the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University, Germany, is planning

modular car production in which products can be regularly upgraded by the manufacturer. Through an innovative reassembly process in a Re-Assembly Upgrade Factory, vehicles can be regularly updated and upgraded to last several times longer than conventional vehicles. The upgrade process is designed to use less than a quarter of the new parts and materials and less than a fifth of the emissions to provide customers with a new and up-to-date product.

The UCE offers the production industry a unique opportunity to combine profitability, resilience, and sustainability. Targeted upgrades and life extension measures not only reduce process complexity and minimize dependence on suppliers but also significantly reduce the use of new parts and materials. This leads to significant reductions in process and material costs, and CO<sub>2</sub> emissions and decouples companies from supply chain risks. The result is an economically and environmentally sustainable value creation business that ensures long-term stability and growth.



**Dr.-Ing. Seth Schmitz**

Chief Engineer Production Management at the Chair of Production Engineering at the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University



# Changing Production Planning Through Circular Economy

Embracing circular business models confronts companies with new challenges. In addition to the inherent tasks for business areas such as product design, production is also facing growing uncertainty. How should a company navigate this new environment and what factors should be considered?

An article by Jonah Schulz, Leuphana University Lueneburg



Image credits: Leuphana University Lueneburg

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Effective production planning and control is essential for manufacturing companies seeking to achieve a high level of logistical performance and customer satisfaction. The implementation of circular strategies such as remanufacturing and refurbishment is driving changes to existing processes. However, many processes do not require a complete redesign, but rather an extension in a strategic and conscious manner. These planning and control challenges are being researched ex-

tensively at Leuphana University. Open workshops, such as the Learning Factory shown in the picture, are used to communicate relevant content and create understanding for our partners in industry.

The implementation of circular strategies inevitably results in a new material flow through the company, which must be designed accordingly by production planning. In addition to the emergence of new material flows, existing mate-

rial flows are also influenced, for example, by the use of the same labour resources for the reprocessing of used products or changing quantity requirements.

The aim of the corresponding planning is to achieve a high level of logistical performance while maximising the contribution to increasing resource efficiency. For example, repairing a used product makes a greater contribution to increasing resource efficiency than remanufacturing, in which only assemblies and components are reused. Whether a repair is even an option depends on both the technological framework and regulatory requirements. If a repair is ruled out for one of the reasons mentioned, it is imperative that a different circular strategy be chosen and planned accordingly.

And it is precisely at this point that the planning complexity increases drastically. As soon as a repair is ruled out, more extensive disassembly and possibly reprocessing is mandatory to be able to utilise the installed components and assemblies. Capacities in the form of employees, workplaces and materials must already be reserved and planned for these processes. These tasks become particularly important when certain workstations or employees are used in both forward production and remanufacturing processes. This gives rise to planning conflicts, and each company must position itself individually by determining the relationship between forward production and remanufacturing and defining the resulting product mix.

Another challenge is that the return of used products compared to purchases cannot be specifically controlled, but usually fluctuates in terms of quantity and quality. Thus, a long-term forecast of the expected used products that are available as returns is required. This already results in the first restrictions when defining a product mix and thus also for the design and planning of production. The latter is influenced by the fluctuations in the

return of used products at different levels. In addition to the uncertain quantity, which mainly has an influence on medium- to long-term planning, the fluctuating quality makes short-term planning more difficult. This is because the uncertain condition of the returns can cause processing and throughput times to fluctuate extremely.

To ensure that these issues can be dealt with in a targeted manner, it is essential to address the cause-and-effect relationships between forward and circular production and to maintain transparency within the company's internal material flow. This will help to counter the uncertainty and lack of clarity that arise, enable the best possible planning to be created and allow the advantages of circular production to be utilised. Because in addition to increasing resource efficiency, product throughput times can be shortened, margins can be increased and fewer raw materials need to be purchased. This means that a company can achieve sustainability goals as well as logistical goals, such as a high level of on-time delivery, short delivery times or short throughput times, and economic goals through circular production with the appropriate planning.



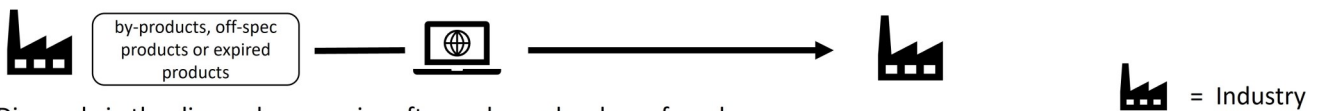
**Jonah Schulz**  
Research Associate /  
Production Management  
Leuphana University  
Lueneburg

# Digital information management for the circular economy in the manufacturing industry

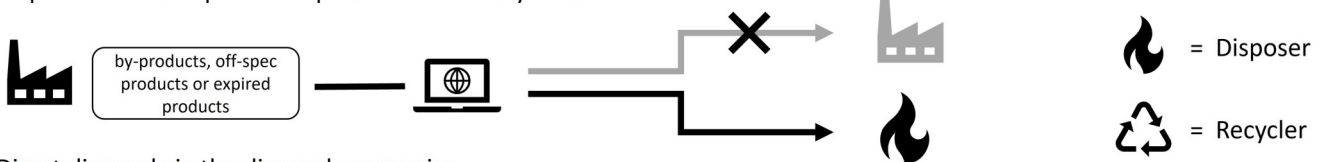
How can by-products be marketed without throwing them away and how can communication between manufacturing companies and waste disposal companies be simplified? The answer to this question was provided within the frame of the project DigInform and relates to development of a customized Information Management System.

An article by Romy Auerbach, Leonie Wenzel & Emanuel Ionescu, Fraunhofer Research Institution for Materials Recycling and Resource Strategies IWKS

## 1. Sale by industry to buyers



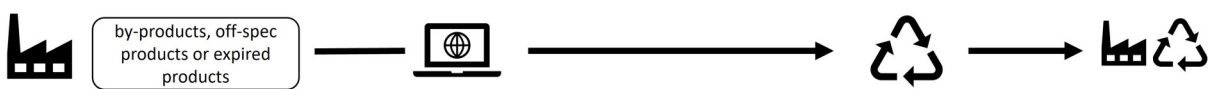
## 2. Disposal via the disposal companies after no buyer has been found



## 3. Direct disposal via the disposal companies



## 4. Recycling via the disposal company as a broker with a third-party provider



Material flow scenarios for the recycling or disposal of by-products and the role of the Information System Management (IMS)

The circular economy is an essential field of action for sustainability and resource efficiency by providing high-quality secondary raw materials for the economy. This requires cooperation between the players in the added-value chain spanning from manufacturing companies as waste producers to transporters/disposers, specialized processors & recyclers and the manufacturing companies that purchase the produced secondary raw materials. Critical points for an

efficient and effective cooperation within this value chain are logistical issues, minimization of cost and environmental aspects, as well as quality assurance of the secondary raw materials. These aspects require efficient information management across the entire supply chain, which enables trustworthy and secure data exchange. Within the frame of a BMBF-funded Digital Green Tech project (DigInform, see [www.diginform.de](http://www.diginform.de)) with five project partners



(i.e., Fraunhofer IWKS, Merck KGaA and GSB Sonderabfall-Entsorgung Bayern GmbH as well as two Research Groups from Technische Universität Darmstadt), a customized Information Management System (IMS) was developed in order to connect all stakeholders involved in the added-value chain related to the valorization of by-products, defective batches etc.

The aim of DigInform was to design an Information Management Systems (IMS) that is able to connect stakeholders in the manufacturing and waste management industries. The developed IMS is intended to provide a platform for the sales market of by-products and waste. It is meant to significantly simplify the transfer of information and, through networking with disposal companies, to recycle unsold by-products, thereby generating ecological and economic benefits. A key component of the development related to the content and software design, programming and testing of the IMS. The platform functions as a kind of digital marketplace where by-products or faulty batches can be offered as technical goods either at a fixed price or in an auction. Important information, such as the composition of the analysis, container size and type, as well as safety data sheets, are entered in advance. If no buyers are found, disposal can also take place via the platform. Potential disposal companies can be contacted to provide information on the disposal route and costs. This simplifies the very time-consuming, bureaucratic disposal process and offers representatives of the manufacturing industry the opportunity to market their by-products. The potential networking of producers and disposal companies created synergies for possible recycling routes of by-products, rejected goods and faulty batches. Initially, the requirements for such a system were developed through discussions with the network partners, expert interviews and stakeholder workshops and implemented in an IMS prototype together with the framework conditions of the in-

dustrial partners. In an iterative process, the user interface of the IMS was adapted to the needs of the customers. With the help of a use case (ammonium phosphate solution, which is a by-product of vitamin production), possible secondary utilization paths were identified. This resulted in a new utilization of ammonium phosphate solution in the paper industry. In addition to investigating the transferability to other material flows and use cases, the effects of the IMS on climate protection and resource efficiency were also quantified and the resulting optimization potential and recommendations for action were described.

In conclusion, the developed IMS can be used to map entire processes from the creation of secondary raw materials to their sale or disposal. This can simplify existing communication channels and create synergies between the manufacturing industry and disposal companies. It is expected that savings can be achieved in the fields of recycling management, communication and process optimization. The savings clearly outweigh the costs, which are mainly associated with the provision of hardware for the IMS and the additional costs related to the further recycling of the by-products. Moreover, communication and data exchange exhibit relatively minor impact concerning their CO<sub>2</sub> footprint.

**Romy Auerbach, Leonie Wenzel, Emanuel Ionescu,** Fraunhofer IWKS, Department „Digitalization of Resources“, Brentanostr. 2a, 63755 Alzenau, Germany



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Fraunhofer IWKS

# Easily create and organise digital twins with Twinjago

Small and medium-sized enterprises (SME's) have so far hardly been able to benefit from the opportunities and initiatives of 'Industry 4.0'. The applications and the required infrastructure are too large, too complex and too risky. Innovative open-source developments can help here. With a new type of platform with a user-friendly front end, Münster University of Applied Sciences offers a flexible and low-cost yet powerful tool for mapping, integrating and controlling digital twins.

An article of the Institute of Business Administration & Engineering (ITB)

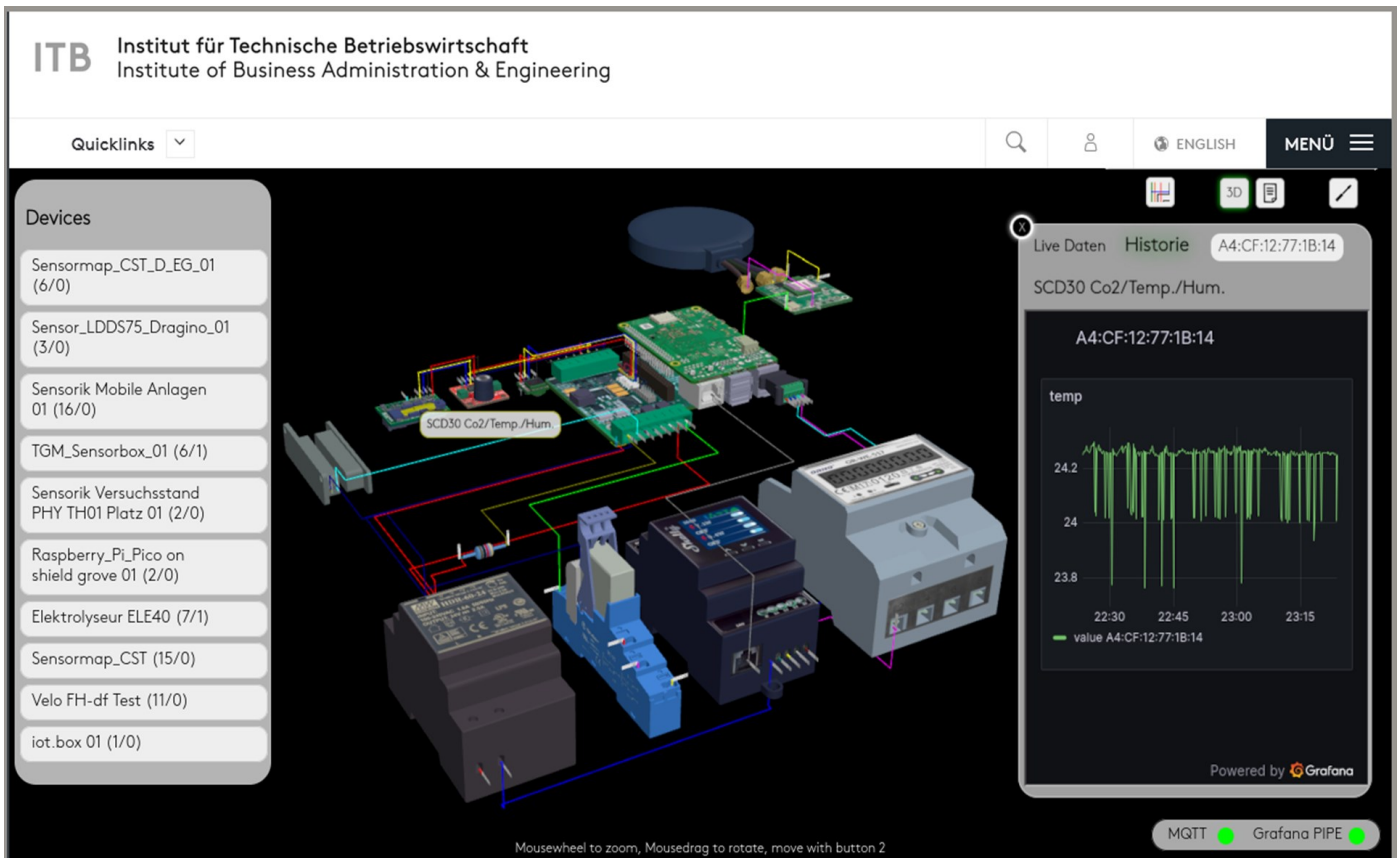


Image credits: ITB

Digital twins open up many opportunities for companies to document, organise and control technical assets. However, access to this technology has so far been associated with risks for SMEs.

Digital twins can be used to store and organise physical objects in a spatially decoupled manner from the real world, i.e. virtually. If neighbouring data streams are linked to the interfaces of this virtual model, a dynamic image is even created, a so-called 'Enriched Digital Twin (EDT)'.

In addition to simplifying access to the object itself, it promotes a deep understanding of the company's data world among users. And it does so without the skills typically required by data scientists or similar experts.

There are already numerous tools for this type of system design, e.g. MindSphere (Siemens), Azure Digital Twins (Microsoft) or ThingWorx (PTC). Regardless of whether the applications come from technology groups, IT platform providers or independent software companies, they lead to high costs, require user training and create long-term dependencies ('lock ins'). This makes these systems unsuitable for small and medium-sized enterprises (SMEs).

**This problem was recognised at the Institute of Technical Business Administration (ITB) at Münster University of Applied Sciences. With Twinjago, a low-threshold open-source platform for EDTs was developed that explicitly gives SMEs access to this technology.**

Twinjago is an intuitive tool for visualising physical objects of all kinds as well as incoming and outgoing data streams. It includes an online configurator for creating interactive 3D views, bitmap labelling, accompanying digital documentation and descriptive tooltips and data paths ('routings').

This means that the programme package essentially comprises the same functionalities as existing systems on the market. However, Twinjago is also characterised by the following special features.

1. Thanks to the intuitive user interface and the deliberately reduced range of functions, anyone with browser experience can easily generate a 3D image in a short time.
2. By reducing image data and using a simple 3D framework, a previously unknown performance of the virtual model is achieved. Suc-

cesses are quickly visible.

3. The data sources from the IoT infrastructure (Internet of Things) relate to just a few clicks. The data flows are visualised in real time.
4. It can be used regardless of the sector and area of application.
5. The objects can be embedded in supersystems without size restrictions. This makes it possible to zoom in and out of the overall system (e.g. sensor module ↔ sensor ↔ sensor map ↔ system ↔ building).
6. The platform was developed exclusively with open-source components. This increases the flexibility of use and, above all, avoids lock-in effects.

**Twinjago has already exceeded the status of minimum viable product (MVP). Further use cases should help to achieve market maturity.**

Various use cases in the laboratory and in practical, operational applications clearly demonstrate the benefits of the tool. Twinjago is to be further developed with other partners from the SME sector and brought to market maturity. The platform is also suitable for use in teaching and further education.



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# The 80% challenge - Managing Emissions where it matters most

Creating In today's rapidly evolving global business landscape, how are you addressing the challenge of managing your supply chain's carbon footprint? With Scope 3 emissions making up the majority of most companies' total carbon output, are you fully aware of the impact they have on your business? What strategies are you using to tackle these indirect emissions throughout your value chain?

An article by Christian Heinrich, Co-Founder & CEO at Carbmee



Image credits: Carbmee

**As the need for comprehensive solutions to measure, manage and reduce carbon emissions and robust data management grows alongside the pressure on companies of all sizes to accurately - and at times rapidly - report their carbon footprint, Carbmee has set out to deliver a solution that focuses on Scope 3 reductions.**

Why focus on Scope 3? The Greenhouse Gas (GHG) Protocol provides a standardised frame-

work for measuring and managing emissions across various sectors, including private and public operations, value chains, products, cities, and policies. It categorises emissions into three scopes: Scope 1 includes direct emissions from owned sources; Scope 2 covers indirect emissions from purchased energy; and Scope 3 encompasses all other indirect emissions in the company's value chain, both upstream and downstream.

Within these three scopes, Scope 3 emissions contribute up to 80% of a company's overall footprint.

### **Understanding Carbon Data Management for Complex Supply Chains**

Managing Scope 3 emissions is inherently challenging due to the complexity of modern supply chains. Companies often work with multiple tiers of suppliers across various countries, each subject to different environmental regulations and technological capabilities.

They must navigate a patchwork of policies that can shift with new climate agreements or advancements in scientific understanding. Accurate data insights are the foundation for understanding the effectiveness of operational adjustments versus investing in new technologies for reducing carbon emissions.

With granular carbon data, companies can transition to net-zero by focusing on the most effective levers, resulting in a high return on investment. It's essential for businesses to ensure compliance with evolving regulations to avoid penalties, which requires cross-departmental collaboration and engagement with stakeholders throughout the supply chain.

Understanding the importance of developing a low-emission value chain is crucial; securing relationships with low-emission suppliers and enabling them to mitigate their emissions is vital for strategic procurement. Achieving compliance involves integrating internal data streams and collecting high-quality, comprehensive data from all suppliers and third parties involved in the company's value chain.

### **Transforming to a sustainable supply chain**

Achieving net-zero emissions requires organisations to lead and mobilise stakeholders, particularly through direct engagement with suppliers. By collaborating closely with suppliers, companies can obtain accurate, validated data that provides

actionable insights into the manufacturing and distribution processes of purchased goods.

This differentiation between emissions produced and those received is crucial for planning targeted, high-ROI reduction initiatives.

When measuring Scope 3.1 emissions, organisations must select appropriate calculation methods, whether spend or activity-based, and gather essential data on product-specific emissions from Tier 1 suppliers and beyond.

Enriching primary data over time is vital, as it offers more accuracy than secondary data, which can serve as a starting point for decarbonization efforts. Identifying the right emission factors and overcoming data gaps are challenges that companies must address to refine their carbon footprint calculations. By proactively engaging suppliers and utilising comprehensive data, organisations can effectively transition to sustainable supply chains.



**Christian Heinrich**  
CEO & Co-Founder  
Carbme GmbH

# Revolutionizing Warehouse Operations: Cellgo's modular automation solutions

Many companies face challenges in logistics: small and medium-sized companies in particular have an unfulfilled desire for automation in order to keep up with the big players. Cellgo offers simple automation solutions that optimize warehouse processes.

## An article by Cellgo

In the rapidly evolving logistics industry, Cellgo is leading the charge in warehouse automation, providing scalable solutions that meet the demands of small businesses. The modular warehouse automation system is designed to simplify small parts storage, offering unprecedented flexibility and efficiency for small and medium-sized enterprises. Cellgo specializes in innovative warehouse automation solutions.

While warehouse automation is commonplace for large logistics sites, small and medium-sized companies in particular face the challenge of designing their warehousing flexibly and adapting it to their individual needs. The targeted automation of manual racking often offers considerable savings potential. A decisive factor here is the seamless integration of automation technology into existing processes and software structures.

The modular storage automate integrates all-in-one technology, ensuring effective and adaptable storage for small parts. This system can be quickly implemented and is suitable for both small and large warehouse operations. With a high storage density of up to 50 containers per square meter, the compact design maximizes space utilization.

## Efficiency Through Innovation

Cellgos intelligent Miniload System enhances efficiency with features like the integrated multi-order picking process, which streamlines order

fulfillment. This means your warehouse operations can handle increased throughput and adapt quickly to seasonal demands or sudden changes in production layout. The seamless integration of our system with existing warehouse management processes ensures minimal disruption while maximizing productivity.

## Ideal for Diverse Applications

Even businesses with limited space can benefit from Cellgo's solutions. The modular design allows for deployment in spaces with low ceiling heights, making it suitable for decentralized warehousing in urban locations. Additionally, the system's plug & play compatibility with online shops and marketplaces enables quick setup for direct sales operations.

Cellgo's state-of-the-art warehouse automation system is designed to meet the diverse needs of modern logistics. The scalable, flexible, and efficient solutions help businesses optimize their warehouse operations, ensuring they are well-prepared for future challenges. Explore the benefits of Cellgo's innovative automation and discover how we can help transform your logistics processes.



**Malik Hafez**  
Co-Founder  
Cellgo GmbH





Image credits: Celigo



# From start-up to global corporations

Mobile robots and automated forklift trucks have become an integral part of production and logistics! Wiferion - a PULS brand, is the market leader with its wireless chargers and enables up to 50% more logistics performance through 'in-process charging'.

An article by Wiferion – a PULS brand



Image credits: Wiferion

Wiferion, a business unit of PULS, is a pioneer in wireless energy supply for industrial applications and is setting new standards in the efficiency and sustainability of mobile robots. In 2023, the start-up was partially acquired by TESLA and is now a leading provider of energy solutions for AGVs that are successfully used in over 20 countries. As part of PULS GmbH from Munich, the devices are present in all major automotive production and logistics centres. Here is their story...

A large production hall was a hive of activity. Autonomous transport vehicles (AGVs) whizzed through the aisles, delivering materials and picking up finished parts. But there was one problem that kept disrupting the smooth process: the loading times. The vehicles had to be taken out of the process regularly to recharge their batteries, which led to costly interruptions. The battery runtimes were often not long enough to last the entire shift and the charging stations were

overloaded. Downtime not only meant lost time, but also huge costs as the fleet never reached its full capacity. One day, the production manager heard about a new technology that promised to solve exactly this challenge. Wiferion, an innovative company in the field of wireless energy supply, had developed a system that enabled vehicles to charge during normal operating hours - completely without cables and without downtime. The so-called 'in-process charging' promised to charge the vehicles precisely when they stopped briefly anyway - be it during loading or unloading or during short breaks between work steps.

The production manager was sceptical, but the idea that his fleet would no longer be out of action for hours at a time sounded promising. He decided to give Wiferion's technology a try. After just a few weeks of implementation, the difference was noticeable: the AGVs were now only stopping for seconds at charging points along their route, and during these short stops they were drawing enough energy to keep running. Uninterrupted 24/7 operation was now a reality and the efficiency of the entire production line increased noticeably.

In addition to the practical advantages, the technology also proved to be sustainable. The vehicles now required smaller batteries as they were constantly recharged at short intervals. This not only saved costs, but also reduced maintenance and service visits to the factory. The production manager's initial concerns quickly disappeared when he saw the benefits: the fleet was always ready for use, downtime was a thing of the past and the entire company worked more efficiently.

Over time, the Wiferion system was implemented throughout the factory and employees recognised the added value in other areas too. The wireless charging technology was not only the solution to an old problem, but also opened up new possibilities in automation and sustainability. Wiferion had

turned what was previously considered an unsolvable challenge into a natural part of daily operations.

The story of this production manager is not an isolated case. Companies around the world rely on Wiferion to optimise their operations and meet the challenges of modern industry. The days when vehicles had to be taken out of service for hours of charging are numbered. Wiferion has created a future where energy supply is efficient, flexible and sustainable - and production continues without interruption. As a result, up to 30% of the AGV fleet can often be saved while maintaining the same logistics performance.



**Julian Seume**  
Director  
Wiferion –  
a PULS brand

 **Detailed information in the techL profile:**  
[Wiferion](#)





# Survey of technologies

We regularly consult experts on their current needs, with tool research being a frequent request. This chapter highlights key technologies we find noteworthy, providing brief product summaries and links to detailed datasheets and contacts in our techL database.



All innovations be found in the  
technology database

**techL**

[www.techl.eu](http://www.techl.eu)

## Clover Optimization

Clover Optimization GmbH develops algorithms for 3D load planning and vehicle routing. The 3D load planning helps to reliably determine the loading meters for notifications, orders, or external assignments. In addition to considering numerous dispatching rules, the highly developed vehicle routing module has the option to perform integrated 3D load optimization—a central aspect of transportation planning. This provides the dispatcher with greater planning certainty and eliminates the need to question the routes generated by the algorithm: Do the packages of the planned route actually fit on the truck? Moreover, integrated planning enables even greater savings in planning time, transportation costs, and the need for vehicles and drivers compared to conventional route planning solutions.



## Cognizant Technology Solutions

Cognizant (Nasdaq-100: CTSI) engineers modern businesses. As one of the world's leading professional services companies, we help our clients modernize technology, reimagine processes and transform experiences so they can stay ahead in our fastchanging world. Together, we're improving everyday life.



## ConcR

At ConcR, our mission is to lead the way in advancing sustainable practices within the construction industry. We are dedicated to providing accurate and validated measurements from concrete structures. By leveraging our innovative sensor technology and advanced data analytics, we aim to mitigate the environmental impact of concrete production and contribute to global climate change mitigation efforts.



## COPA-DATA

COPA-DATA is an independent software manufacturer that specializes in digitalization for the manufacturing industry and energy sector. Its zenon® software platform enables users worldwide to automate, manage, monitor, integrate and optimize machines, equipment, buildings and power grids. COPA-DATA combines decades of experience in automation with the potential of digital transformation. In this way, the company supports its customers to achieve their objectives more easily, faster and more efficiently.

The family-owned business was founded by Thomas Punzenberger in 1987 in Salzburg, Austria. In 2022, with more than 350 employees worldwide, it generated revenue of EUR 69 million.





## Cybus

Cybus software solutions are designed specifically for industrial manufacturing and its complex challenges. With the high-performance and scalable Factory Data Hub, Cybus brings open collaboration between manufacturing and its IT. Cybus empowers factories to gain long-term independence from manufacturers and vendors.



## Data Coffee

Data Coffee provides software to make your Machine & IOT Data available in minutes to achieve transparent and objective data base for decisions in running and developing production. We create a standardized interface across all systems and enable simple and application-specific data exchange between industrial protocols, controllers and any IT systems. We convert machine data into relevant and meaningful information and visualisations and make them available for other controls, IT systems or business models, as ai driven analytics or customer used applications.



## divoice GmbH

We integrate voice assistance technology into business products and business applications to take your business to the next level. With extensive experience in hardware and cloud-based software, we offer expert advice and support to help you develop and optimize your voice-assisted solutions. Working with you, we'll create a customized success plan and ensure your product is reliable, effective, and market-leading. We help you realize the full potential of our voice assistance technology.



## drag and bot

At drag and bot we work daily on making the programming of industrial robots as simple and intuitive as possible. In this way we support our customers in the flexible and cost-efficient automation of their processes.



## driveMybox logistics

driveMybox is a digital service for the truck transportation of containers. We simply link transport capacities and demand online, from the price inquiry to the invoice. Real-time updates are available at any time during the transport process. We are more than just a platform - we are a contractual partner and responsible for every single order.



## Energy Robotics

Our mission at Energy Robotics is to relieve humans from dangerous, repetitive and undesirable tasks through autonomous robotic inspection. Our teams of expert roboticians and passionate developers are striving to improve the Energy Robotics software platform to boost operational efficiency and workplace safety in industrial environments. Energy Robotics provides an end-to-end solution for autonomous inspections in capital-intensive industries such as oil & gas, chemical, power and utilities. Our hardware-agnostic software platform enables asset owners to easily manage a fleet of robots and drones for autonomous inspection.



## greenable GmbH

Our innovative software for calculating the carbon footprint of products offers an effortless and efficient way to improve environmental performance and achieve sustainability goals. The Product Carbon Footprint Monitor is characterized by a simple structure and intuitive operation. You can easily get started and collect accurate emissions data.



## i-flow

Clean data in factories. Quick & easy. Bridging the gap between factory systems and industry 4.0 technologies has never been easier. With i-flow you can model, map and prepare data from all your factory assets for use in any system.



## iLARIZ

iLARIZ, based in Stuttgart, is a start-up with a Swabian-international team of innovation-oriented experts in forming technology. We focus on the process reliability of forming processes and the reduction of scrap costs in forming production. All our expertise is incorporated into our fully automated systems for digitalized monitoring through to active control of forming processes. In addition, we offer our know-how as part of our engineering services for all production areas.



## luna AI

IUNA AI Systems GmbH is a company founded in 2020 and located in Heilbronn, Germany. We develop Deep Learning based image processing software and camera systems to automate manual inspection as well as quality assurance in industrial manufacturing.

We want to take automation in industrial manufacturing to the next level in the field of visual inspection and quality assurance. In doing so, we help companies work more efficiently and sustainably increase the quality of their end products.



## Loady

Loady wants one thing above all: to make B2B logistics smoother, more digital and sustainable. This is why the company launches "Loady", the first standardized platform for master data on loading and unloading requirements, in 2023. Loady's innovative idea: in order to achieve consistently high data quality, shippers and recipients manage their transport-relevant information on the platform themselves. They then share their data "first-hand" with logistics partners, digitally and in a clear, standardized structure

Loady offers public APIs to bring current loading requirements directly to where users need them: their TMS, ERP, freight orders, e-procurement, YMS or OBUs. Additionally, Loady ensures effective communication with drivers and freight forwarders via multilingual online views such as "Loady2Go" and "Loady2Share". Tender specifications can be easily managed in Loady with just a few clicks. For liquid transports, Loady offers a central pre-product database for the first time.



## Makula

Empowering OEMs, machine suppliers & distributors to win in the Aftermarket!

Real revenue lies ahead of Machine Sales in the equipment manufacturing industry. After-sales services carry 80% of the profits. Makula manages it all.





## Mansio

MANSIO revolutionizes heavy-duty long-haul transportation with an innovative relay system. Trailers are swapped from one truck to another along long-distance transport routes. This reduces carbon emissions by avoiding empty runs and simplifies the use of e-trucks. Additionally, it halves fixed costs by enabling trucks to operate in two shifts. MANSIO, a German startup in the seed stage, has developed this proprietary software system and operates it as the world's first mover, making our software unique globally.



## Mimetik

The path towards highly efficient, fully connected factories goes through empowering the workers who are enabling the smooth operations at each step. While decades of work have gone into creating digital twins of factories, it's time to integrate the intelligence and agility of workers to complete the picture. Mimetik's IoT sensor digitizes manual work steps with zero infrastructure costs and without cameras, ensuring high privacy standards for easy adoption. By creating a digital twin of your best workers, you can optimize and automate the work environment, assist workers throughout the day, and improve efficiency.



## nebumind GmbH

nebumind offers manufacturing companies a data analysis software for automatic quality monitoring and process optimization. The software collects data from machines and sensors during manufacturing, visualizes them as "digital twins" of the manufactured components and makes them available for automated analyses. With this concept, nebumind helps its customers to speed up the industrialization of new manufacturing processes, to detect defects early in productions and to adapt manufacturing processes more flexibly.



## Peakboard

Peakboard is a low-code platform for the simple and intelligent digitization of manufacturing and logistics. Users create individual applications with the hardware and software solution to optimize their industrial processes and thus ensure more operational excellence in the company. The company of the same name, Peakboard, was founded in 2016 and is based in Stuttgart.



## Peeriot

We are a German deep-tech start-up that combines Peer-to-Peer and IoT with the goal to simplify data exchange between devices.

We help enterprises to manage the integration and the data flood of their devices easily by providing them a software for decentral IoT communication, which enables self-organized devices and knowledge networks.



## Pelico

Pelico's operations management system connects factory teams to manage unplanned bottlenecks and deliver products on time, at cost. It empowers operational teams to continuously monitor bottlenecks, anticipate issues, and act fast with AI-assisted recommendations, simulations and cross-team collaboration.



## Phantasma Labs

At Phantasma, our purpose is making human work with today's AI solutions more smart and efficient. By building market-leading, industry-grade reinforcement learning-based models we enable AI-driven automation in enterprises without the need for big data. Our smart factory product line is an AI solution for manufacturing companies, that can suggest real-time optimal decisions for different areas of production planning.



## scitis.io

scitis.io is a young company with a big vision. We combine the expertise and clout of several medium-sized companies and are the one-stop store for our customers when it comes to digitization.

We offer a manufacturer-independent Industry 4.0 platform for industry, plant and machine tool manufacturing. Our goal is to give our customers the opportunity to offer their own IIoT solution for their plants. The focus is always on generating process knowledge and product optimization.



## Synsor.ai

Munich-based AI Start-up, building a "predictive quality" AI for the manufacturing industry. Our main goal is to enable the real-time analysis of both image- and machine -data on a singular platform. This allows the detection of even the earliest warning signs, and through that the prediction of defects and process issues.



## tulanā (Vishwakarma GmbH)

tulanā is an intelligent decision support system for planning functions in manufacturing, making it possible for leaders to navigate a world of complexity and uncertainty. As opposed to current planning tools, it enables robust and forward-looking planning while being highly configurable. Using the latest techniques in artificial intelligence and stochastic optimization, it finds the best tradeoffs between unmet demand, high inventory costs and scarce resource availability, all while considering costs, business constraints and the complexities of your manufacturing processes. Better planning results in increased predictability of operations, higher cost efficiency and fewer crunches on your personnel. Plan for the future. Plan for the unexpected. Plan with tulanā.



## Wiferion

We are Wiferion, the leading provider of automated, wireless energy transfer for industrial applications. Our inductive charging systems maximize the performance of electric industrial vehicles such as AGVs, AMRs, forklifts, and cobots, revolutionizing intralogistics workflows. Our technology delivers unprecedented fleet efficiency—maintenance-free, safe, and flexible. As a key part of automated production, our disruptive charging technology helps companies boost productivity while reducing project costs.









