

Issue 2019

# logged in

THE MAGAZINE FOR  
SOCIAL NETWORKED INDUSTRY



Exoskeletons promise relief during heavy physical work

- **Swarms of drones, etc.:** demonstrators make the future of logistics a tangible experience
- **Transfer projects:** how people and technology work in a team
- **Workplace Innovation:** more acceptance for new technologies

The more flexible the  
processes, the more flexible  
the organisation

From working time model up to rest-break management:  
how the intelligent shelf can support people





# 01 editorial





## Dear Friends and Colleagues,

**SHELVES COMMUNICATE** with people and recognize who is in front of them, algorithms playfully plan machine maintenance, intelligent containers and pallets negotiate autonomously, route themselves to the recipient and trigger payment processes. Artificial intelligence will change all our lives as fundamentally as the coming of the automobile, the computer or the smartphone has done.

The potentials are immense and will penetrate everything beyond the visible – from the single machine and the factory through to global value networks. Swarms of autonomous vehicles in factories are examples of how value chains will work in future. Artificial intelligence will undoubtedly become the strategic competitive advantage of the future. In future, its use will determine how successful companies will be on the market, but also how successful Germany will be as a business location facing the competition of globalization.

Logistics will be among the first industries in which AI processes will gain full-scale acceptance. Why logistics in particular, some will ask themselves. The answer is simple: because it can be made completely “algorithmic” and is more highly standardized than any other industry.

One key requirement is for the economy to break away from the manufacturer-bound systems of Silicon Valley and to enter the open and federal data and platform economy of the up and coming Silicon Economy, in which people, companies, autonomous vehicles and IoT devices interact with each other.

It is both our goal and an opportunity of the century to create a complete environment for this new “Silicon Economy”. Many technologies have already been tried and tested and are gradually being implemented in products and business models. In the Innovationlab Hybrid Services in Logistics we are working on further technologies at full speed, but also on rules for this new data and platform economy.

Help shape this new world. Suggestions and practical examples, new demonstrators and projects that contribute to the Silicon Economy can be found in the new issue of “logged in”.

Enjoy reading this exciting edition. Yours

**Prof. Dr. Dr. h. c. Michael ten Hompel,**  
Managing Director of Fraunhofer IML

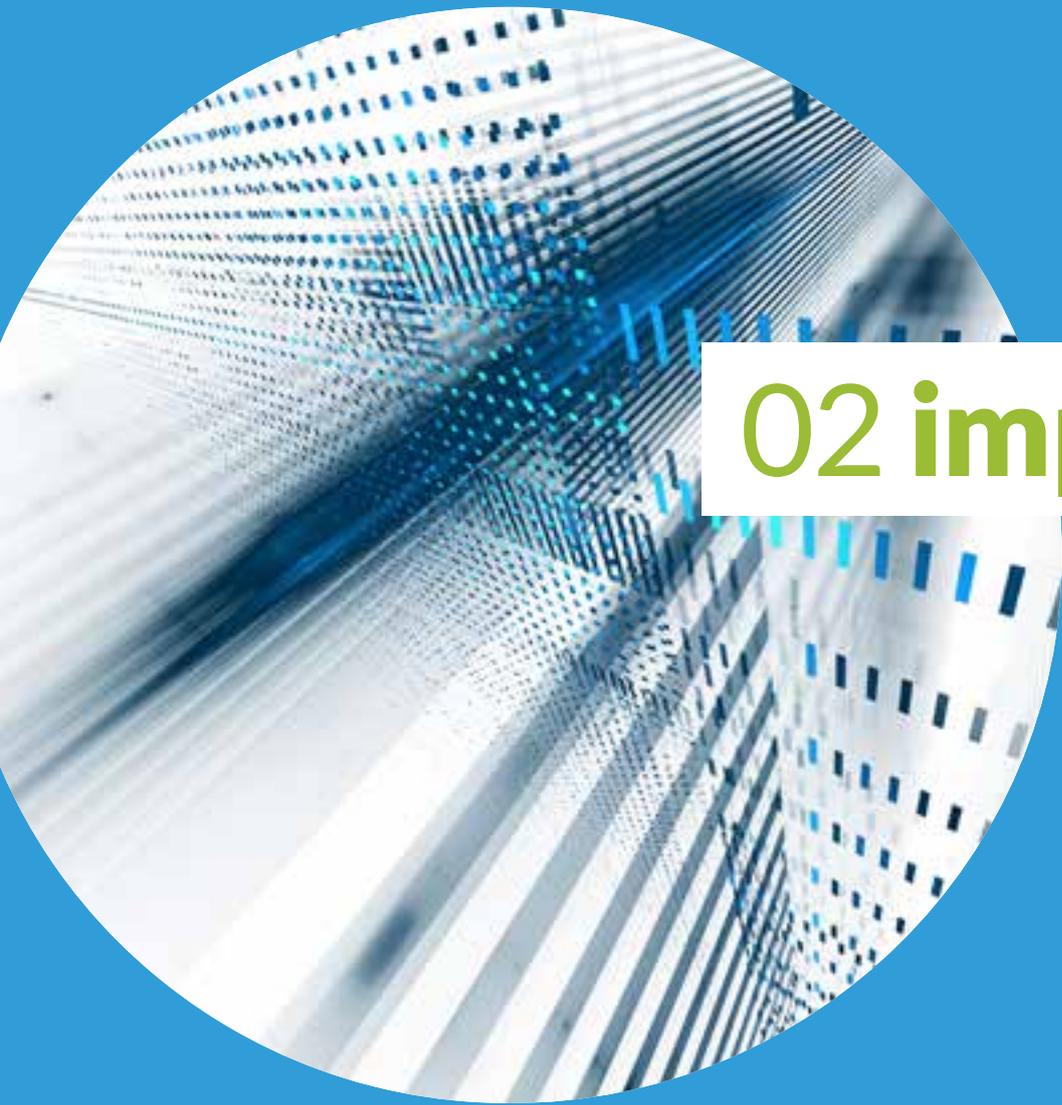


Here you can learn more about the potentials of Silicon Economy and initiatives for the realization of Artificial Intelligence (AI) processes.



If you would like to stay up to date, subscribe to our newsletter “logistics ahead”.





# 02 impetus



# The more flexible the processes, the more flexible the organisation

Digital solutions for the purpose of work organization help to design this new form of cooperation between humans and technology in the social networked industry to be as uncomplicated and natural as possible for the staff. The focus is on developing an “intelligent shelf” that communicates with people and recognizes their stress level. Businesses are already highly interested in testing the product.

Today, work organization is often regarded as a key component for the success of Industry 4.0. Here, as in the development of hybrid services in the Innovationlab, people must once again be the focus of attention. As “cognitive all-rounders” they are irreplaceable in the working world of the future. It is therefore important to adapt to their abilities and needs when organizing work in a flexible technological environment. One of the central research questions is therefore: how can work organization be designed in a way that improves employees’ productivity and satisfaction while taking into account their individual physical and mental capabilities?

“Digital technologies are essential for the development of new solutions for work organization in the social networked industry.

Andreas Nettsträter

Digital technologies are clearly absolutely essential when it comes to the development of new solutions for work organization in the social networked industry. Although labour researchers and sociologists are definitely not wrong to point out that it is in fact the very increase in ergonomic human-technology interaction making work more intense that in turn means new forms of work organization are necessary. Nevertheless, the digitization of work organization is a logical consequence of the social networked industry – always on condition that any design is humane.

## Working time and break models have to change

The fact is that working time and break models will have to change (not only) in the social networked industry. Already today, employees in logistics and production, for example, miss breaks, interrupt them or take them too late because their work has become more intense or because the demands of the work – especially in terms of information and therefore psychology – have increased. The consequences range from short-term negative physical and mental stress and accidents through to an increasing risk of illness. Employees are off sick – or so frustrated that they leave the company. In logistics, this problem can be observed primarily in intralogistics. By

the way, there are significant parallels to the current situation in the care sector.

## Intelligent shelf organizes work digitally

If there is talk about intelligent shelves in logistics today, it is as a component of modern goods management. Shelves “report” when goods are missing, order replenishment on their own and thus replenish themselves again. However, researchers in the Innovationlab Hybrid Services in Logistics are now developing an intelligent shelf as the heart of work organization. This shelf is to ensure that work can be organized more flexibly by allowing people – as the conductors of the system – to work more flexibly. The main functions of the intelligent shelf will include em-

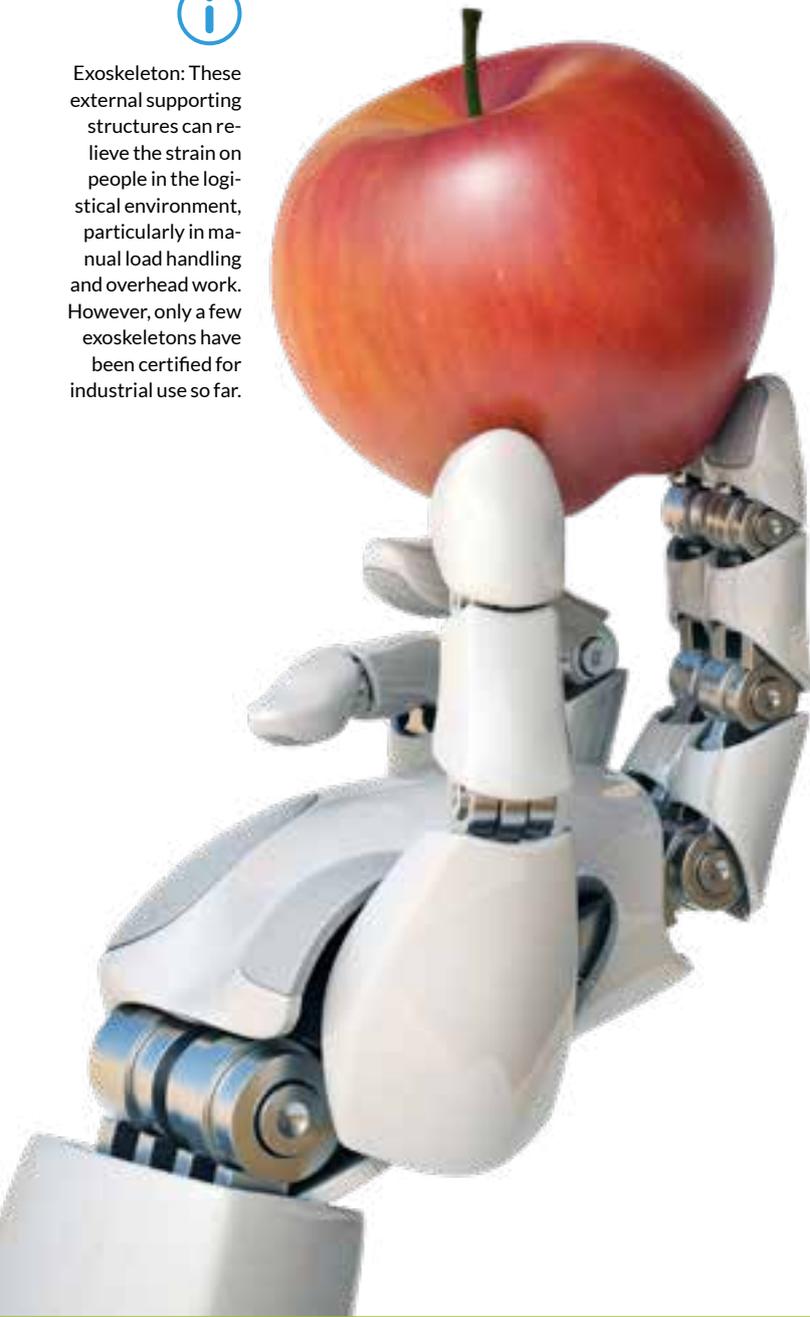


You can find the complete article on the internet:





**Exoskeleton:** These external supporting structures can relieve the strain on people in the logistical environment, particularly in manual load handling and overhead work. However, only a few exoskeletons have been certified for industrial use so far.



ployee recognition and communication with employees. The shelf and employees will be able to communicate via display, gestures and natural speech. It is particularly important that the shelf is able to recognize the stress level of each employee. Accordingly, breaks should be recommended individually and based on physiological stress parameters.

### Equipped with cameras, sensors or microphones

The shelf is specifically equipped with cameras, sensors or microphones, and the employees receive respective digital helpers. This allows parameters such as sweat, pulse or blood pressure – and thus physical and psychological stress – to be measured. The systems are to be given a certain amount of intelligence in order to evaluate the various parameters. Here, too, logistics is very close to the care sector. In addition to fatigue warnings – such as those already used in cars – the system should also be able to give specific recommendations for further work organization, for example on the use of work aids such as exoskeletons, which are also being tested in the Innovationlab.

### Renowned companies have signaled their interest

With the intelligent shelf, the Innovationlab's project extension until the end of 2020 thus represents an important bridge from the development of human-oriented high-tech solutions for efficient work processes to products for human-centered digital work organization. Renowned companies have already signaled their interest in digital solutions for work organization and intend to test the technology demonstrator in the operating environment. An essential prerequisite for implementation in practice will be the handling of the data acquired by the employees. In principle, it must be ensured that no values leave the environment or that they are passed on to a central system. <



#### About the author

Andreas Nettsträter, Department of Strategic Initiatives at Fraunhofer IML, is responsible for Network Management and Knowledge Transfer in the Innovationlab.

## INNOVATIONLAB CONTINUES RESEARCH UNTIL THE END OF 2020

**The Federal Ministry of Education and Research (BMBF) approved the extension for the large-scale research project at the beginning of the year.**

The Innovationlab, funded by the BMBF with 10 million euros, started in mid-2016 and was initially designed to run for three years. The research work can now continue until the end of 2020 and the funds have been increased by around two million euros. "So far, our focus has been on testing novel human-technology

collaborations and networking the individual participants", says Arkadius Schier, Manager of the Innovationlab. "However, the current research results have enabled us now to also consider and, above all, test in practice questions regarding the overarching organization of work."

Within this context, two new work packages will be added to the extension of the research work. On the one hand, it is about interactive work systems in which people and technology manage logistical and production tasks in a

social network and, on the other hand, about – also indirectly – communication technologies between people and machines on the basis of smart services. Both work packages are strongly networked with each other.

Parallel to the extension of the research project, the infrastructure and the human-technology demonstrators in the two test halls set up in the context of the Innovationlab – the research and the application centre – will be used for further experiments and investigations.

# More acceptance for new technologies with “Workplace Innovation”

The Dutch logistics sector is regarded as being extremely productive and innovative, yet it faces major challenges. For some years now, massive investments have been made in technology programs. As an approach to the successful introduction of new technologies, the so-called “Workplace Innovation” is recommended.

**W**PI focuses on the concept and implementation of practices or a combination of activities that empower employees, either structurally (through division of labour) or culturally (through empowerment), to engage in organizational change and renewal, i.e. to improve the quality of working life and organizational performance. WPI researchers start from the idea that “employees are our most valuable asset”. Work processes and HR practices should be organized in a way that employees benefit from a higher quality of working life and organizations achieve higher performance. In this sense, WPI can be understood as a best practice approach. With this in mind, WPI can be understood as a best practice approach.

## Five paths to a successful launch

Basically, there is not just one way to introduce or to put WPI into practice as a company – researchers have now identified five ideal paths:

- ▶ Top management controlled WPI. The WPI initiative comes from the top management. However, the measures are implemented with the participation and support of the employees. In these cases, the employees also show the desired innovation behavior.
- ▶ Autonomy-based WPI. This path is taken by companies that use their organizational autonomy developing WPI measures to secure their future. At the same time, employees have a high degree of autonomy and the opportunity to participate. Primarily, it is about securing the future viability and existence of the company – and not about an organizational model that strives for the highest quality of performance or the highest quality of working life.
- ▶ Integral WPI. In this configuration, WPI measures are initiated from bottom up with the help of the employees, providing them with opportunities and skills for innovative behavior. The organization has room for maneuver for its own decisions and favours a limited division of labour. Structural and behavioural elements are integrated.
- ▶ Employee-driven WPI. With this solution, the WPI is essentially initiated from the bottom up and implemented



in a participatory manner. The organization has scope for its own decisions and at the same time leaves employees room to participate in the development of the organizational model.

- ▶ Innovation-driven WPI. Companies that choose this path to WPI prefer a limited division of labour and allow employees to innovate or to behave innovatively (e.g. proactively developing new ideas, taking risks in developing new solutions). However, employees do not take part in the development of the organization model.

Research shows that certain combinations favor WPI, while others are less promising. Companies then have room to make their own strategic decisions. What all these paths have in common, however, is that employees should play a significant role in introducing WPI practices. <



You can find the complete article on the internet:



## Our authors

Steven Dhondt (photo) is an employee at the Netherlands Organisation for Applied Scientific Research TNO. Further authors are Paul Preenen, Peter Oeij, Katarina Putnik, Wouter van der Torre and Ernest de Vroome.



**THE MORE HETEROGENOUS** the articles that have to be packed in a carton, the more complex the task: the digital packaging assistant “passt” guides the employee – here developer Benedikt Mättig – through the packaging process.



**LIGHT AND COLOUR SIGNALS**

show the employee how to pack the articles in a carton to save as much space as possible. This simple and inexpensive system offers individual and effective support for the employee. It facilitates training and helps to minimize stress.

# Change in value creation: In search of business model 4.0

**Companies can only tap the full potential of digitization if they provide innovative digital products and services with new, valuable business models.**

**W**hen it comes to digital business models, companies like Airbnb or Uber that have completely changed existing markets are often named. They have even managed to revolutionize an entire industry without a physical product of their own. Other companies, however, made formerly physical products like music CDs, books or video cassettes available anywhere and anytime as digital products on platform markets and founded a completely new market. In fact nobody can escape these changes in value creation today. That applies in particular to technological innovations by Industry 4.0: according to a study by business consultants McKinsey, 80 per cent of all companies expect this to have an influence on their own business model. However, a structured

further development of business models rarely takes place in everyday business life – despite being highly relevant for a company’s success. In the context of digitization, growing companies in particular have the opportunity to develop new services and therefore new business models on the basis of established successful products. In the Innovationlab Hybrid Services in Logistics, the scientists will use various showcases along the supply chain to demonstrate how both existing and new technical solutions can be combined with modern services. Practical business models must also be considered during this development process. A good example of this is the “passt” system (abbreviation for packing assistant), a digital support for intralogistics staff developed in the Innovationlab.



You can find the complete article on the internet:





“passt” (abbreviation for packing assistant) shows the employee the intended packaging position of articles within the shipping carton by marking them with LED stripes.

### Service provider instead of hardware supplier

The benefits of this assistant lie in the clear visualization that neither restricts the employee’s field of vision nor the freedom of movement, in its simple integration in existing packaging workstations as well as in its cost-effective implementation. In combination with the PUZZLE® software, providing a packing scheme that either already exists or that can be generated dynamically by an optimization algorithm, the loading of pallets and shipping cartons can also be further optimized.

Within the context of developing the “passt” business model, the scientists focused the value proposition of the new packaging assistant on three key benefits for potential users. First, when packaging the goods, less space is wasted and process times are improved at the same time. Secondly, the risk of damage to the goods is reduced.

Thirdly, the system is so easy to operate that employees can familiarize themselves with it very quickly. The key value proposition identified here was an improvement in the customer's packaging processes in terms of time and quality criteria.

Up to now, the packaging assistant only exists as a prototype. However, the researchers in the Innovationlab have slipped into the role of a future supplier. If this “future supplier” wants to effectively keep up the value proposition of the new system, they have to actively control the quality of the processes at the customer's site and thus continuously improve their product. In this context, the recommended business model is an approach in which the manufacturer does not enter the market as a hardware supplier but as a service provider. In the age of digitization, more and more business models are based on this principle.

Several models are possible: subscription with monthly fee or pay-per-use, i.e. the customer only pays if he uses the system, possibly also depending on the size of the packaging or the weight of the goods. Such variants promise the customer a solution which is both economically profitable and technically reliable. The advantage of this business model 4.0 for the company is that they can position themselves as a service provider. <



“Rent instead of buy” refers to a paid, temporary right of use, “pay-per-use” refers to a remuneration for what is actually used.



### About the author

Ellen Sünkeler, Fraunhofer Institute for Material Flow and Logistics IML, is responsible for Marketing and Communication at the Innovation Laboratory.

# 03 innovations



# Transfer projects bring people and technology together

People and technology work as a team in the social networked industry. In three transfer projects at the Innovationlab, companies have now been able to sound out what this looks like in practice. These have shown that employees' acceptance of digital assistants is high – and the efficiency gain for the company is also high.

## Virtual reality trains employees better

1 Today, industrial employees in warehouses are generally prepared for new picking methods with classic “lecture style training”: A trainer explains the rough sequence of a system and uses an example to practice the relevant commands with the employees. This is also how it is normally done with the pick-by-voice system from Dortmund-based intralogistics company **proLogistik**. “However, the company was very interested in making their training more digital – in line with their digital product”, says Christoph Schlüter from Fraunhofer IML and explains how the cooperation with proLogistik came about in one of the now twelve transfer projects at the Innovationlab (nine completed, three ongoing). In this context, researchers and company representatives developed a training course which gets the knowledge across in a playful way. It turned out that employees are now more motivated and willing to learn and the results are ultimately better when using virtual reality and gamification elements. The pick-by-voice system developed by proLogistik is a picking assistance system in which the user has both hands free during all processes. This is possible because the system is operated by voice instructions with corresponding audio feedback. However, this also means that the employees have no visual information or assistance to help them.

This means good training and support before and during order picking is unavoidable, as otherwise the users are inadequately prepared. As part of the transfer project, a digital scenery and a robot were integrated in the game which was set up for the digital training in which the employees are guided through all the stages of picking in the system. The test persons, who had different previous experience in dealing with virtual reality and games, were positive about the digital training. They considered the use of new technologies to be necessary so that companies can survive in the market in the future. They found the training itself pleasant, informative, instructive and varied, and they completed it with a high degree of concentration.

“Due to the demanding, lively instructions given by the demonstrator, the employees felt both driven and supported”, observed Robert Rothbauer, project manager at proLogistik. “The use of playful elements was particularly well received.” Moreover, the employees evaluated the free movement within the virtual game environment and the relaxed atmosphere of the game as advantageous. There was no physical or psychological discomfort that VR newcomers might experience. As a result, the employees clearly preferred digital training to lecture-type training.



proLogistik now wants to further develop the prototype for their virtual training and integrate it in their service portfolio.



Employees are guided through all the stages of order picking within the digital scenery with its integrated robot.

## Nursing staff communicates with hospital bed

**2** Every year, 20 million people occupy the 500,000 hospital beds in Germany. This means the beds have to be cleaned and prepared at least 20 million times accordingly. Today, nursing staff, medical technicians and cleaning staff still have to coordinate these processes by telephone or e-mail – quite apart from the fact that maintenance and repairs to beds also need to be coordinated. Together with the manufacturer of hospital beds **Stieglmeyer** from Herford in East Westphalia, scientists from the Innovationlab have now developed a smart label for hospital beds as part of a transfer project with which the processes in hospitals can be considerably slimmed down. “Instead of laboriously and manually writing a work order in the ward room, employees can trigger and check all necessary actions directly at the bed”, says Marcus Hintze from Fraunhofer IML, who was in charge of the project for the Innovationlab. “This creates a new human-technology interaction between those involved in the process and the hospital bed according



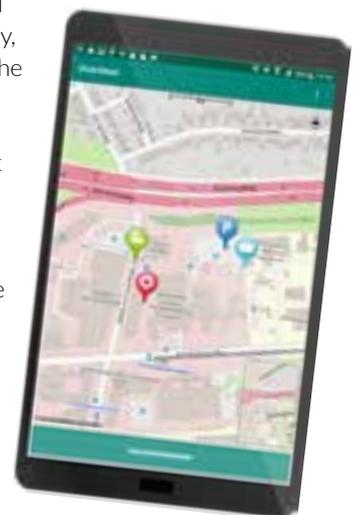
**+** Stieglmeyer has already presented the demonstrators to hospital specialists at two trade fairs. After completion of the project they are being set up and tested at the transferee's site.

## App helps driver to locate gas tanks

**3** The on-site delivery of liquefied petroleum gas still poses great challenges for tanker truck drivers and their employers today. The addresses of customers, who are often located in rural areas, are indeed easy to find thanks to modern navigation systems. However, the tanks to be filled are often hidden or underground, especially on private properties. As many customers are only supplied at large intervals and companies often use different drivers, they then spend up to ten minutes per order in searching for the tanks on site on terrain unknown to them. If the owners are at home, they can instruct the driver. Yet, the aim of liquid gas suppliers such as **WESTFA** in Hagen is actually to ensure that supplies can be made independently of the presence of customers. Within the context of the transfer project at the Innovationlab, scientists from Fraunhofer IML and the company therefore developed a tool to locate gas tanks. This also shows the optimum position for the tank truck to stand in when filling the tank. “For a long time, the company has relied on digital tools to support its employees in other tasks”, says Martin Friedrich from Fraunhofer IML, who is in charge of the transfer project. “Therefore, the question of whether employees would accept other smart devices to support them was particularly important to us.” The early involvement of employees has paid off in this context. The software was implemented in real situations and used by selected

**+** WESTFA is currently working on further possibilities to use the technology, both to support the drivers and to optimize the processes. Further specific use cases are being discussed in-house.

WESTFA drivers during a test phase lasting several weeks. Both the technical application and the user-friendliness were tested. Errors and complicated operating concepts could thus be detected and corrected quickly. “Basically, it also demonstrated that the majority of employees viewed innovations positively and tried them out without resistance”, Oliver Höring, Managing Director of WESTFA, is pleased to say. “We can use the qualitative and quantitative results for the acceptance of smart devices in day-to-day transportation within the context of further development.” <



### About the author

Silke Bruns is a freelance editor and regularly reports on new technical developments in the Innovation Laboratory Hybrid Services in Logistics.

to the guiding principles of Industry 4.0.” The Smart Label is a device barely as big as a smartphone that is attached to the lower end of a bed frame. It visualizes information like bed and patient ID or the status of the bed and it digitally supports inspection, maintenance and cleaning processes. The nursing staff on the wards can initiate a work order to prepare a hospital bed directly at the bed with just a few clicks of a button. Transport service and cleaning staff receive the orders via an app. Another positive (secondary) effect for hospital operators: The location of a bed can be retrieved at any time using beacon technology. Marcus Hintze says: “In fact, the localization of beds and medical devices is currently one of the most important fields of activity in clinics. Today, employees are often excessively busy finding beds in the hospitals that need to be maintained and checked. Thanks to the indoor location, long search times are now a thing of the past and the number of beds becomes transparent for those responsible in the hospital. The employees themselves have more time for their actual tasks.”

## THREE QUESTIONS FOR ...



**Kaspar Wernecke**  
Management,  
Wilhelm Wernecke GmbH & Co. KG,  
Plettenberg

### **Why did you apply to the Innovationlab Hybrid Services in Logistics to participate in a transfer project?**

We are a metalworking company in the third generation which is characterised by classic historical growth. Of course, this also applies to our machinery. Our goal was to create pervasive transparency with regard to current material and machine statuses between production, logistics and administration. In the beginning, this seemed like a mammoth task. The transfer project, however, gave us the opportunity to develop a prototype solution with a reasonable amount of effort, small investment and support from scientific professionals.

### **The “networked production control in digitized metal processing” transfer project arose from this task ...**

Our core business is clearly not the digitization of processes. But within the context of this project, we succeeded, together with the researchers, in increasing transparency and communication between administration and production – namely by introducing smart devices and developing a logistics assistance system linked to the ERP system managing the data. This is also accompanied by increasing the connections between systems and people. For us, this is an important step towards securing our competitiveness. This is because customers are expecting to receive production data closer and closer to real time as possible. After completing the transfer project in the spring of this year, we now know that we will also be able to continue to meet such requirements with our machinery – and with a cost-effective solution as well.

### **Can you recommend participation in such projects to other companies?**

Absolutely. It gives companies the opportunity to initiate the development of a new product or new processes within a limited timeframe. The ideas and impulses can then be developed even further subsequent to the project. Personally, I also like the fact that the researchers developed a solution based on our tasks that can not only be used in our company but is also suitable for other small and medium-sized enterprises.



The **application centre** serves as a demonstration area for new technologies that support the **cooperation between people and technology.**

Five showcases – trade, maintenance, production logistics, transport and virtual training – demonstrate specific application examples.

The material flow typically found in a manufacturing company is revealed in the application centre. The use of digital technologies can therefore be experienced in an operational context.



### SHOWCASES ILLUSTRATE SPECIFIC EXAMPLES OF APPLICATIONS

#### SHOWCASE INTRALOGISTICS

- › MotionMining shelf
- › Autonomous drones for warehouse inventory
- › Rolling transport drone
- › AR-supported inventory in trade
- › Adaptive working place
- › AR-supported palletizing

- › Digital packaging assistant
- › Picking robot “Toru”
- › Container stacker “Sam”
- › Climbing shuttle “Rackracer”
- › Driverless transport vehicle “FLIP®”
- › Exoskeleton for manual load handling

#### SHOWCASE MAINTENANCE

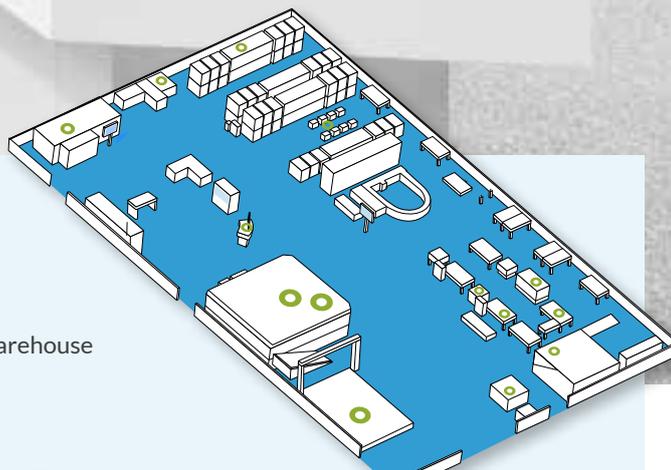
- › AR-supported repair on site
- › Predictive maintenance

#### SHOWCASE PRODUCTION

- › Camera-assisted assembly
- › Collaborative gripper arm

# Innovative test systems make the future come alive

From adaptive workplaces to virtual employee training, from drone swarms to AGV robots: More than 20 innovative demonstrators in the research and application centre at the Innovationlab provide a unique impression of digital transformation in logistics.



## SHOWCASE TRANSPORT

- > Dynamic scheduling with smart devices
- > Supplier-neutral pick-up shelf

## SHOWCASE VIRTUAL TRAINING

- > VR-based employee training in the warehouse

## SOCIAL NETWORKED INDUSTRY

- > Social Network



Click here to go to the interactive hall plan of the application centre.



The equipment in the research centre is oriented towards two topics which will be highly relevant in logistics research in the future: localization and wireless communication.

Due to the flexible equipment and test rigs, only a few of which are fixed installations, a large number of autonomous objects can be brought together in the research centre under ad-hoc and decentralized control in order to provide logistical services.



Click here to go to the interactive hall plan of the research centre.



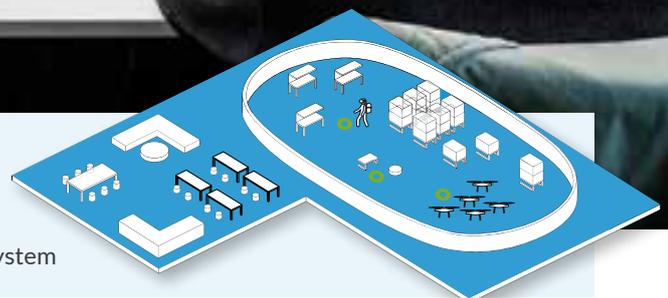
### INFRASTRUCTURE AND DEMONSTRATORS

#### INFRASTRUCTURE

- > Motion capturing system
- > Radio measuring system
- > Laser projection system

#### DEMONSTRATORS

- > Virtual reality system
- > Drone swarm
- > Driverless transport robot system



# A valuable prediction

For the first time, researchers from the Innovationlab have combined machine failure prediction results with a profitability calculation. This makes predictive maintenance calculable.

By using intelligent analysis methods it is already possible to predict machine failures today. However, for many companies the question of how to deal with predictions is still an obstacle to implementing predictive maintenance. The decision to remove a value-adding machine from the production process has a major impact. However, by setting economic targets, predictive maintenance can now be calculated.

A demonstrator in the application centre of the Innovationlab demonstrates the principle: here, test persons can make decisions in game mode whether and when to withdraw a machine from day-to-day operations for predictive maintenance or repair. Every "move" has a financial impact. In principle, a successfully completed transaction of the machine is valued at 6,000 Euros. If the machine is stopped as part of planned predictive maintenance, however, a loss of 7,500 euros emerges. In the event of an unforeseen machine breakdown, however, the loss rises to 20,000 euros. The experiments on the demonstrator show the following: if the person decides on their own, the result after six run-throughs is clearly worse than if it is supported by an assistance system with recommendations for action that are economically well considered. In the context of human-centered social networked industry however, people can also overrule recommendations made by the digital assistant – for example, if they come to a different conclusion based on their experience.

The research results are currently being included in the PlatonaM associated project funded by the Federal Ministry of Economics and Energy (BMWi). In the "Smart Data Management" project, digital machine data based on a new platform ecosystem are to be used securely and legally as an independent economic asset. <



When it comes to deciding when and whether predictive maintenance of a machine is economical or not, the assistance system uses a **simple traffic light system** to help people decide.



In the application centre at the innovation laboratory, visitors can test predictive maintenance on the **miniature model** – simply by pressing a button.



## About the author

Fabian Förster, scientific employee at Fraunhofer Institute for Material Flow and Logistics IML, is responsible for the showcase maintenance in the Innovationlab.





## “House of Commons” debate about the digital working world

Should machines replace people at work? Do smart systems make work simpler or make the workers lonely? In May, around 50 employees from different industries, students and researchers were involved in a so-called “House of Commons” debate at the Innovationlab’s application centre about how they imagine the working world of tomorrow. The event involving interested practitioners was initiated by research-

ers from the Leibniz Institute for Work Research (IfADo), the Fraunhofer Institute for Material Flow and Logistics IML and the Social Research Centre of the TU Dortmund. Various theses on the digitization of the world of work were discussed. As in the British House of Commons, the participants demonstrated their point of view by choosing their seat and actively influenced the discussion with their contributions.

# 2.000.000.000.000.000

(= two quadrillion) arithmetic operations per second can be performed by the new super computer Nvidia DGX-2 at the Fraunhofer Institute for Material Flow and Logistics IML. Since the summer of this year, scientists at the Innovationlab have also been using the computer for sophisticated AI applications in logistics. In particular, they use it to train algorithms for classification procedures because machines “learn” by analyzing example data. Application scenarios range from intelligent document management and the automatic recognition of labels for dangerous goods in transport logistics, to the optimization of pallet loading in intralogistics.

### Successful campaign

RTL presenter Frank “Buschi” Buschmann (photo below) visited the Innovationlab for a film shooting of the RVR’s (Ruhr Regional Association) location marketing campaign “City of Cities”. The clip is part of a video series in which Buschmann calls on company bosses outside the Ruhr Region to invest in the Metropole Ruhr – with typical Ruhr Region frankness and tongue in cheek. In order to familiarize Siemens boss Joe Kaeser with Industry 4.0 “made in Dortmund”, Buschmann packed parcels with BVB fan articles using data goggles (even though Kaeser is actually an FC Bayern fan).



### Successful premiere

The application centre at the Innovationlab was the main venue for the first TRANSFER.FESTIVAL of the Digital Hub Logistics Dortmund in June. More than 100 participants were able to actively shape their day with a free choice of workshops (instead of lectures).

There were also guided tours of the application centre and demonstrations in the neighboring research centre at the Innovationlab.

## Hall tour with live demonstrations at the “Logistics Day”



The Innovationlab Hybrid Services in Logistics in Dortmund opened its doors for the first time for the nationwide “Logistics Day”: within the scope of a tour with numerous live demonstrations of innovative technologies, around 80 interested visitors dipped into the future of production and logistics at Germany’s Industry 4.0 location. The more than 20 test systems in the two test halls of the Innovationlab illustrated the current state of logistics research for the no. 1 future industry. At the same time, the guests were able to get an idea of how well people and technology will work together in tomorrow’s social networked industry. The annual “Logistics Day” is an initiative of the German Logistics Association (BVL).



## About us

The Innovationlab Hybrid Services in Logistics is an interdisciplinary research project in which technological innovations are developed for a Social Networked Industry. The focus is on human-technology interaction. Our so-called showcases – which are organised in the five fields of trading, production logistics, transport, maintenance and virtual training – guarantee that innovations are transformed into hybrid services.

The Federal Ministry of Education and Research (BMBWF) initially funded the project over a period of three years (to the end of 2019) and extended for another year until the end of 2020. On the one hand, the Innovationlab is intended to strengthen Dortmund's pioneering role in services and logistics, and, on the other, to accelerate the acceptance and implementation of technical solutions in the context of Industry 4.0. Academic and industrial partner networks and social partners and multipliers from the Ruhr metropolis and beyond are integrated in the work of the Innovationlab.



SPONSORED BY THE



Federal Ministry  
of Education  
and Research

## Publishing details

### Publisher:

Innovationlab Hybrid Services in Logistics  
c/o Fraunhofer Institute for Material Flow and Logistics IML  
Joseph-von-Fraunhofer-Str. 2-4 | D-44227 Dortmund

### Editorial team:

Ellen Sünkeler, Fraunhofer IML (responsible)  
mehrzeiler & kollegen, Oberhausen (concept and realisation)

### Images:

Title front page/back page: Michael Neuhaus;  
page 2 shutterstock; page 3 Fraunhofer IML; page 4 shutterstock;  
page 5 shutterstock; page 6 shutterstock, Fraunhofer IML;  
page 7 private; pages 8-9 Michael Neuhaus, Fraunhofer IML;  
page 10 shutterstock; page 11 manufacturer/Fraunhofer IML;  
page 12 manufacturer/Fraunhofer IML (2), private; page 13 private (4);  
pages 14-16 Michael Neuhaus (2), hall plans: Fraunhofer IML;  
page 18 shutterstock; page 19 Fraunhofer IML (3)

