

# INNOVATION

# Unique Ecosystem for the Future of Logistics

DIGITAL HUB LOGISTICS DORTMUND

RESEARCH

FLAGSHIPS

TESTBEDS

SME ENABLER

START-UP-SUPPORT AND ENTREPRENEURSHIP

ENTERPRISE LABS

TALENTS





## A highly exciting environment for companies

### 3 questions for Thorsten Hülsmann, CEO Digital Hub Management GmbH

**Which industries does the hub address?** The Digital Hub Logistics in Dortmund is one of the world's leading digital ecosystem dedicated to logistics. It is driving digitization – whether in logistics, production and manufacturing, retail or services. The ecosystem consists of several competence centers, lighthouse-projects and initiatives on basic and applied research, education, SME support and various labs and testbeds and supplements this with the areas of smart talents, capital and start-ups.

**How does the Hub support businesses?** The Digital Hub Dortmund creates a highly exciting environment for companies that want to get involved in applied research, technology development and bring potential new digital products and processes to the market. The hub and its ecosystem thus contribute to the sustainable future development of Europe as an high-tech location.

**Who facilitates the Hub?** Digital Hub Logistics Dortmund, a fully operational Digital Innovation Hub recognised by the European Commission, is a cooperation between three competence Centers – the Fraunhofer Institutes for Logistics and Material Flow IML and for Software and Systems Engineering ISST and the Technical University of Dortmund. It is orchestrated by Digital Hub Management GmbH and supported by various companies like Port of Duisburg for example.

## CONTENT

- 4 COMPETENCE CENTER
- 6 RESEARCH
- 8 FLAGSHIPS
- 10 TESTBEDS
- 11 SME ENABLER
- 12 START-UP-SUPPORT AND ENTREPRENEURSHIP
- 13 ENTERPRISE LABS
- 14 TALENTS
- 15 PARTNERS





## UNIQUE ECOSYSTEM FOR THE DIGITAL TRANSFORMATION OF INDUSTRIES



**Fraunhofer**  
IML



**Fraunhofer**  
ISST



**tu** technische universität  
dortmund

In recent years, the major scientific institutions in Dortmund have fostered numerous initiatives and projects in the field of logistics and digitization and with that creating the structures for sustainable innovation development in the high-tech logistics sector. The result is a unique ecosystem for the digital transformation of industries. The aim is to support the development and faster dissemination of innovative products and processes. An essential basis for the development of specific formats and services is networking.

# IMPULSGEBER FÜR DIE ZUKUNFT DER LOGISTIK

## COMPETENCE CENTER



The **Fraunhofer Institute for Material Flow and Logistics IML**, with its headquarter in Dortmund and co-locations in Frankfurt, Hamburg, Prien and Beijing, is regarded as the first address in holistic logistics research and works in all fields of internal and external logistics. In the spirit of the Fraunhofer idea, solutions to problems are developed for immediate use by companies and further, preliminary research is carried out over a period of two to five years, in individual cases even longer. The institute, founded in 1981, employs more than 300 scientists as well as 250 doctoral candidates and students, supported by colleagues in workshops, laboratories and service areas.

Teams assembled according to project and customer needs create cross-industry and customer-specific solutions in areas such as material flow technology, business process modelling, transportation systems and resource logistics. Other current research focuses lie in the areas of artificial intelligence, smart finance and the "Internet of Things", which is coordinated Fraunhofer-wide by Fraunhofer IML.

As one of the most important player in logistics research, Fraunhofer IML takes on responsibility in several well-established international committees and organizations.

## COMPETENCE CENTER



The **Fraunhofer Institute for Software and Systems Engineering ISST** works with companies to identify the value of their data. The focus lies on the use of data as well as the sovereign handling of data as a strategic resource in Data Ecosystems", especially regarding logistics, healthcare and the data economy. From data preparation to the development of new business models, the Dortmund-based institute with its approximately 100 employees offers complete system solutions for companies. Concrete topics of the work include consulting, conception and implementation of data strategies, on data management, software architectures and digital business models, as well as the development and use of data processing methods

based, among other things, on artificial intelligence. With the architecture of the "International Data Spaces", Fraunhofer ISST and its research partners create a framework for the controlled sharing of data and the sovereign handling of it. The International Data Spaces can therefore be seen as a blueprint for successful Data Ecosystems.





## COMPETENCE CENTER



With numerous scientific awards and prizes, more than 1,000 third-party funded projects, international cooperation and large associated projects, the **TU Dortmund University** is one of the most respected technical universities in Germany. The range of degree courses on offer comprises around 80 courses, ranging from classic to innovative subjects, among other things including the logistics degree course. The various scientific disciplines are united by a university spirit in which interdisciplinarity and interaction, communication and cooperation

are practiced. As a result, technological innovation, progress in methods and knowledge are virtually programmed at the TU Dortmund University. The environment for successful research is shaped by strong partners such as the affiliated institutes from the Fraunhofer-Gesellschaft. As an award-winning start-up and entrepreneur university, TU Dortmund University supports the transfer into application. The neighboring Technology Park Dortmund is one of the largest and most successful in Europe.

## ORCHESTRATOR



The **Digital Hub Management GmbH (DHM)** promotes Dortmund as a location for innovation and research and supports the transfer of innovative technologies and research results into the economy. DHM is supported by the Digital Hub Logistics e. V. As a non-profit organization, DHM is committed to the establishment, coordination and management of networks, initiatives and projects that operate on a local, regional, national or international level. One thematic focus lies in the areas of digitization, digital technologies and data, which have a positive impact as

cross-sectional functions in all industries and economic sectors - but especially in logistics, production, trade and information technology. Founded in 2010 as EffizienzCluster Management GmbH (ECM), the activities surrounding the innovation ecosystem of logistics in Dortmund are once again moving more into the focus of the perception of industry, research and politics with the renaming and further development of the company in the new decade.

## EUROPEAN NETWORK

Networking with international partners in European research projects, but also in European technology platforms such as the "Alliance for Innovation through Collaboration" (ALICE), the European Factories of the Future Research Association (EFFRA) or the Big Data Value Association (BDVA) is part of the ongoing activities of all actors. Thus, the Digital Innovation Hub Dortmund positions itself as an innovation partner and research testbed for projects on a regional, national and European level. The focus is

on the realization of multidisciplinary and pan national innovation concepts. In addition, the hub wants to enable SMEs in particular to get to know new European partners and integrate them into innovation projects. At the same time, the actors are committed to providing companies with access to independent and active participation in European bodies and initiatives.



Awarded: The Digital Hub Logistics Dortmund has won the first Champions Challenge of European DIHs in 2019.

## EXEMPLARY RESEARCH NATIONALLY



In the **Silicon Economy Logistics Ecosystem** project, funded by the German Federal Ministry of Transport and Digitalization with 25 million euros, the partners are creating a new infrastructure and technical components for the logistics platforms of the future.



In the **Blockchain Europe** project, funded by the state of North Rhine-Westphalia, the European Blockchain Institute in Dortmund is being established and a research program for the institute is being developed that addresses key research needs.



Under the umbrella of the **Center of Excellence for Logistics and IT**, ten interdisciplinary research groups, the research clans, are further developing current research within a clear thematic context and setting up roadmaps for the future.



The **EffizienzCluster LogistikRuhr** provides a platform for cooperation, innovation and infrastructure that supports companies in their competitiveness. The Federal Ministry of Education and Research (BMBF) funded the project with more than 40 million Euros.

## RESEARCH

# ACHIEVE MORE WITH JOINT RESEARCH

Logistics research is still a relatively young discipline. Therefore, the extremely dense research and innovation infrastructure in Dortmund can be taken even less for granted. The unique ecosystem has developed significantly over the past ten years. The sciences' demand that companies should invest one percent of their turnover in applied research also raised awareness on the part of industry of how important research and development is for an industry that has also developed into a high-tech industry over the last ten to fifteen years. The basics for this development have been laid by the scientific facilities of the Digital Hub Logistics – driven particularly by today's Competence Centers: Fraunhofer IML, Fraunhofer ISST and TU Dortmund University.

As ambassadors of modern logistics research – on an equal level with disciplines such as mechanical engineering, elec-

trical engineering or IT – , the major scientific institutions in the relevant national and international networks, committees and organizations have not only promoted the establishment of logistics research – on an equal footing with disciplines such as mechanical engineering, electrical engineering or IT and software engineering – but have also set standards with their own research activities, both at the conceptual and technological level.

With associated research publicly funded by the EU, the federal government and the federal states as well as contract research for industry, the scientific institutions of Digital Hub Logistics ecosystem now cover the entire innovation chain from basic research, pre-production and applied research up to prototype construction, pre-series maturity, product development and market uptake. The innovations developed will be used by participating





companies throughout Germany and Europe. The research results from publicly funded projects are also available to other interested companies. At the same time, basically new collaboration formats became established with which gaps in research and transfer can be closed and future topics can be specifically addressed. Particularly remarkable is the constantly updated and direct transfer stream from research to teaching and application within the Digital Hub Logistics.

Logistics research is now facing the next challenge: advanced digitization and thus artificial intelligence and its enablers like data sovereignty and smart data infrastructures, which all

in all is changing everything for everyone. According to research, logistics will be the first industry in which platforms, blockchains, and AI processes will gain mass acceptance. The decisive course for the development, testing and validation of new technologies is currently being set in the Digital Hub Logistics.

In the platform economy of the future, it is primarily open-source solutions that offer companies competitive advantages. The idea is becoming dominant that it is the companies themselves that are shaping these developments. Dynamic user communities are thus becoming another flagship of the Dortmund innovation ecosystem.



## EXEMPLARY RESEARCH INTERNATIONALLY

**DIH-WORLD**

The DIH-World project, with more than 40 partners from 26 countries, aims to harmonize and expand the landscape of European Digital Innovation Hubs across Europe.



The EU-project DIGILOGIC is developing solutions for Smart Logistics with start-ups, SMEs and innovators through a pan-European-African network of Digital Innovation Hubs.



The Eur3ka research and innovation project aims to help the manufacturing and healthcare industries respond quickly and efficiently to major medical crises.



In the EU project Manufacturing Industry Digital Innovation Hubs, medium-sized companies in Europe are optimally prepared for industry 4.0 with support services and training opportunities.



The EU project DIH² aims to share expertise on agile production and robotics challenges – including technology, investment, standardization, but also ethics, data and Internet safety – with SMEs.



## EXEMPLARY FLAGSHIPS



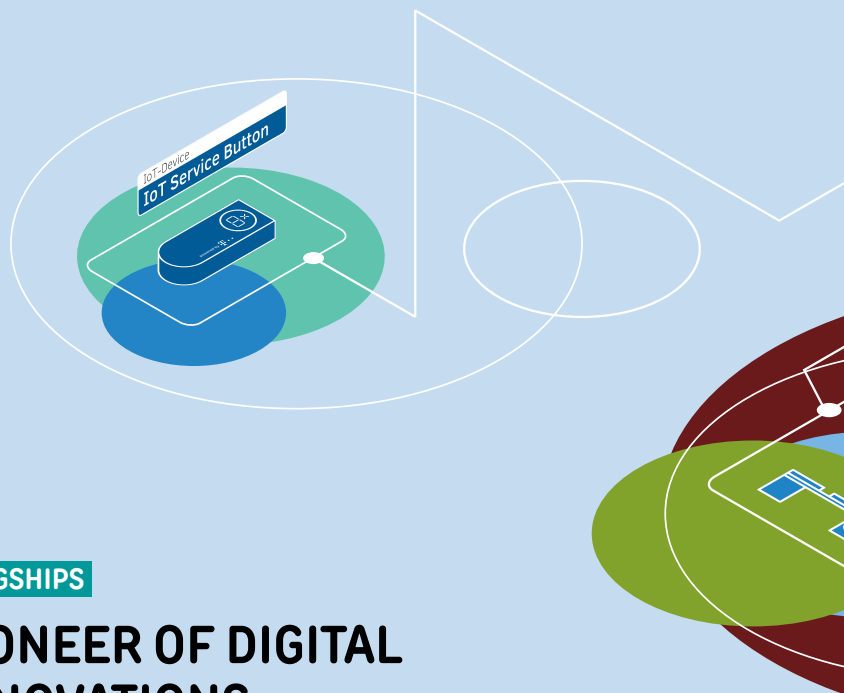
The **Silicon Economy** is a project of the Fraunhofer Institute for Material Flow and Logistics IML, supported by the logistics industry. A growing user community is participating in the development and use of open-source hardware and software for the platform economy of the future. The synergistically connected implementation projects "Silicon Economy Logistics Ecosystem" and "Blockchain Europe" contribute to this project.



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. The Federal Ministry of Education and Research (BMBF) is funding the project with more than 10 million Euros.



The **International Data Spaces Association** aims to guarantee data sovereignty by an open, vendor-independent architecture for a peer-to-peer network which provides usage control of data from all domains. More than 100 companies and institutions of various industries and sizes from 20 countries are members of the association.



## FLAGSHIPS

# PIONEER OF DIGITAL INNOVATIONS

With the Internet of Things, Industry 4.0 and artificial intelligence, fundamentally new business models, services and products as well as innovative forms of interaction between people and technology have found their way into an increasingly networked economy in recent years. One of the essential prerequisites for this is an intelligent data infrastructure. Against this backdrop, strategic initiatives and projects are regularly launched within the Digital Innovation Hub ecosystem

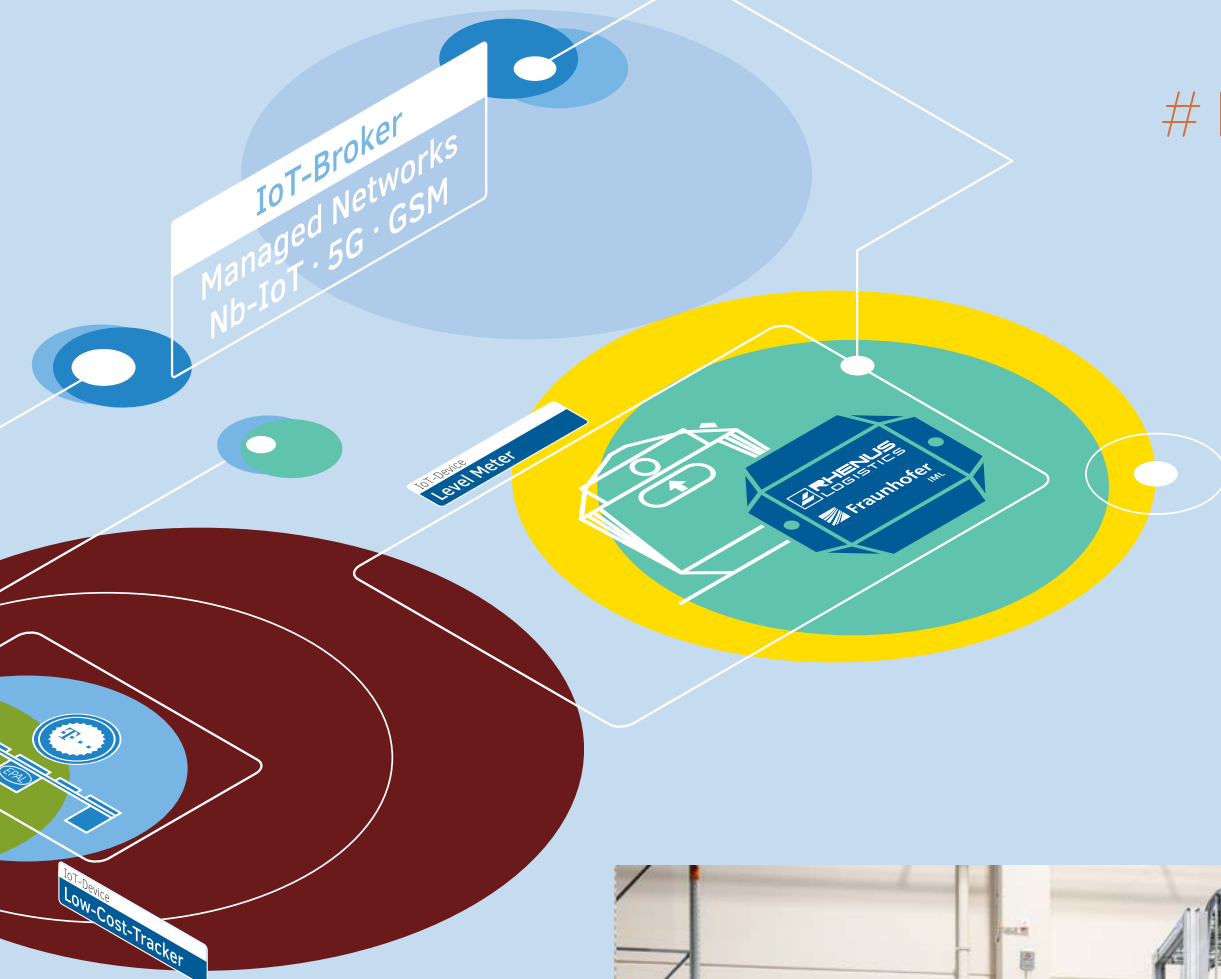
that pay attention to the "big picture" of fully digital logistics. These flagships focus, for example, on testing and deploying new technologies, determining technology acceptance, and designing innovative products and services that make digital business models possible. Industrial value creation is being rethought here: open innovation and agility are the ground rules for collaboration between partners in the flagships. The broad participation of industry, in particular small



Research meets politics: The Silicon Economy is presented at the German government's digital summit.



## # FORMATS



and medium-sized enterprises, and quickly implementable use cases ensure that research reliably reaches the real world.

With the so-called Social Networked Industry, for example, the Dortmund scientists have recently already initiated a paradigm shift regarding the design of Industry 4.0: They placed the “guarantee of success” human at the center of the fourth industrial revolution and relied on the intuitive interaction of humans and technology through intelligent assistance systems. Numerous developments for the Social Networked Industry are currently being continued in the Silicon Economy, the latest flagship at the science location. The Silicon Economy stands for the diversity and coexistence of different logistics and industrial B2B platforms. In this way, it positions itself as a counter-design to a platform economy that is based on monopolistic platforms - as can be observed today in the B2C

sector. With a view to a platform ecosystem, open-source solutions are being jointly developed in the Silicon Economy in the area of both software and hardware, which are available to all companies and ultimately ensure the standardization of logistical processes. The integration and networking of infrastructures, including the use of components from the International Data Spaces to create secure data spaces and through the cloud

infrastructures being built in the “GAIA-X” project, are among the Flagship’s other goals.

Unusual event formats and contemporary digital communication ensure exchange with business, science, politics and society. In this way, research becomes visible on a national and international level, and the digital pioneering role of the science location is further strengthened.



## EXEMPLARY TESTBEDS



In the **Research Center Hybrid Services in Logistics** at TU Dortmund University, new methods and technologies are tested in experiments e. g. in the field of localization and wireless communication.



In the **Application Center Hybrid Services in Logistics** at Fraunhofer IML, new methods and technologies can be demonstrated realistically in a model environment.



In the **LivingLab Cellular transport systems** at Fraunhofer IML, the largest experiment of artificial intelligence in intralogistics takes place.



The **Legal Testbed** is a digital experimental field for automated business processes. It will place negotiations and contracts between machines on a legally secure basis.



The **International Data Space Lab** at Fraunhofer ISST offers infrastructure for software development projects and collaboration on data sovereignty and IDS implementations.



## TESTBEDS

# CREATE SPECIFIC INNOVATIONS

The research infrastructure at a science location creates the prerequisites for competitive leading edge research. In recent years, research and application centers as well as demonstration halls with ultra-modern equipment have been set up, particularly in the competence centers of the Digital Hub Logistics. Here, new technologies for the logistics future are tested, specific innovations are generated through applied research and put into practice by the participating companies. Anja Karliczek, Federal Minister of Education and Research, already described the test halls of the Digital Hub Logistics ecosystem as one of the "largest European research campus".

A major focus of the research infrastructure is on the Internet of Things, on cyberphysical systems and data sovereignty and data ecosystems. More than 100 demonstrators in various testbeds provide the basis for the current industry 4.0 competence at the location. The research infrastructure therefore makes a significant contribution to the modernization of traditional industries. Topics such as artificial intelligence, blockchain and smart contracts

are currently becoming increasingly important.

Many of the demonstrators and test systems are jointly operated by the competence centers and their partners. Representatives from science and industry involved via the hub's partners generally have access to the testbeds without red tape. There, they can operate, analyze and validate their own developments – often in a business context. This is particularly attractive for small and medium-sized enterprises.

International delegations, for example with representatives of European networks or industrial companies, regularly take the opportunity to get informed about the current state of logistics research and logistics during guided tours through the testbeds. Moreover, the test halls are again and again venue for congresses or conferences. The testbeds are also open to the public. Guided tours and events foster discourse on topics such as the new role of humans in industry 4.0 or the opportunities and risks of artificial intelligence.

## SME ENABLER

## A TANDEM INNOVATION LEAP

Ever further, ever faster, ever higher: Digitization is changing the economy, business models and business processes. The time of long pre-runs is over. However, small and medium-sized enterprises (SMEs) in particular are still not exploiting the full potential of digitization. While large companies and corporate groups often have sufficient resources at their disposal to drive the digital transformation forward on their own, small and medium-sized enterprises first of all need offers for tailor-made consulting and skills qualification.

What does digitization in an industrial context mean? What is the benefit for my company? How can I implement digitization projects in my company? Who are the best partners? In the Digital Hub Logistics, companies at different maturity levels are supported in strengthening their competitiveness and developing new business fields in the context of digitization and Industry 4.0. With a multitude of service modules, the companies are accompanied in a targeted manner during the introduction of digital products and processes.

The principles of SME support in the Digital Hub Logistics include simple experimentation with new technologies, promoted cooperation with R&D partners and entry into cooperative research and development with manageable risk. Particularly in cooperation projects with research, companies lay the foundation for their future implementation in their own companies or for innovative market services. The starting point is always the specific innovation requirement of a company. In addition, interested companies can also participate in the results of research projects in which they were not involved themselves. In particular, these are research results from the flagships, which are made available to companies in transfer events such as workshops, etc.

With the innovation approach of start-ins, the Digital Hub Logistics also establishes a completely new form of SME support for digital transformation. Start-ins are independent digital units of already established companies.

## EXEMPLARY SME ENABLER

DIGITAL IN NRW  
KOMPETENZ FÜR  
DEN MITTELSTAND



The SME Enabling Center **Digital in NRW** – part of the funding initiative “Mittelstand 4.0 – Digitale Produktions- und Arbeitsprozesse” (“SME 4.0 – Digital Production and Work Processes”) of the Federal Government – prepares the topics of digitization and networking specifically for small and medium-sized enterprises in North Rhine-Westphalia and submits specific offers to them for joint implementation. All support services are free for the enterprises.



START-IN FACTORY

The **Start-in Factory** of Digital Hub Logistics offers companies a variety of innovation modules with which they can accelerate digital transformation processes. The prerequisite for using the service is a paid membership.





## EXEMPLARY START-UP-SUPPORT



The TU Dortmund University bundles its measures relating to the founding of young companies and to knowledge and technology transfer in a central university institution, the **Center for Entrepreneurship & Transfer**.



DIGITAL LOGISTICS AWARD

The **Digital Logistics Award** of the Digital Hub Logistics rewards creative business solutions for the digital working world in logistics, but also in other, related industries.

**STARTPORT**

**startport GmbH** – a company of the duisport Group – is an innovation platform for start-ups focusing on logistics and supply chain located in the port of Duisburg.



The **start2grow** start-up competition organized by the Economic Development Corporation Dortmund supports start-ups throughout Germany with a unique network for the development of new business ideas.



**Exzellenz Start-up Center.NRW** is an initiative of the state of North Rhine-Westphalia to promote more start-ups from universities. One of the first centers is located at TU Dortmund University.

## START-UP-SUPPORT AND ENTREPRENEURSHIP

## A NEW INNOVATION CULTURE

Start-ups in the field of logistics are often very technology-oriented and have a high level of data and ICT competence. The Digital Hub Logistics contributed to establishing entrepreneurship as an important complement to research and transfer in Dortmund and to increasing the number of start-ups. In particular, the facilities at the hub support students and scientists in exploiting their innovative ideas and research results in start-ups and spin-offs.

Start-ups are supported through all development stages from the genesis of ideas to the rollout of products. The experts of all institutions in the Digital Hub Logistics are available to them for the content-related and technical further development of their business ideas and their implementation, including the research infrastructure. This allows the founders to use the know-how and equipment of the organizations for their specific purposes. At the same time, they have access

to a comprehensive coaching program. Moreover, the founders receive support in financing issues and in identifying potential investors.

Lack of both market access and distribution channels are one of the biggest challenges faced by start-ups. The Digital Hub Logistics therefore brings the founders together with small and medium-sized enterprises (SMEs). In joint cooperation or pilot projects, start-ups can generate feedback loops and test phases as well as subsequent sales as a result. Moreover, the representatives from both worlds also exchange information in regular meetings and learn from each other. The Digital Hub Logistics, gives start-ups the opportunity to be included as practical partners in tenders for national and international research projects.





## ENTERPRISE LABS

### TOP SPEED RESEARCH

Enterprise Labs are research and development partnerships between scientific institutions and large companies. The format was developed in Dortmund for medium-term and strategic cooperation with respect to cross-industry research by Fraunhofer IML. The basic idea is to translate research results into products or new business models at top speed. Through new and interdisciplinary forms of cooperative development without red tape, a high degree of transparency between industry and research is achieved. Direct participation in development processes enables companies to participate directly in the design of tomorrow's solutions.

In the Enterprise Labs, researchers and company representatives work closely and actively together and implement innovations in direct cooperation. The focus is on the common path from topic identification to the market-ready business case. In addition to contemporary manufacturing

technologies (e.g. 3D printing or SMD manufacturing), temporary workstations are provided in modern co-working areas.

The symbiosis of theory and practice enables the implementation of ideas that are directly angled at the customer's business processes. Companies quickly gain practical insights into the technological maturity, applicability and willingness to implement new logistics products, services and business models.

Another added value for the companies is the networking and cooperation between the Enterprise Labs. Apart from the lived bilateral exchange, an annual meeting of all labs takes place in which the participants inform each other about the orientation and current work in the respective lab. That triggers off new joint cooperations and projects.

#### EXEMPLARY ENTERPRISE LABS

- ◆ DACHSER Enterprise Lab
- ◆ DB Schenker Enterprise Lab for Logistics and Digitization
- ◆ EPAL Lab
- ◆ Keller & Kalmbach Future Lab
- ◆ Rhenus Enterprise Lab
- ◆ Sick AG Enterprise Lab
- ◆ Telekom Open IoT Labs
- ◆ Trade Finance Innovations Lab mit der Commerzbank
- ◆ Würth Enterprise Lab

## TALENTS

## WAYS INTO SCIENCE

Well-trained researchers are in demand in both science and industry. The promotion of young scientists is therefore an important prerequisite for conducting top-level research and producing innovations. The Digital Hub Logistics also includes initiatives for the promotion of talents that advance scientific careers in the national and international environment, like the Graduate School of Logistics.

In both publicly and privately funded doctoral programs, the interdisciplinary cooperation of young scientists on the basis of a committed methodological or terminological exchange between all participating disciplines has high priority. The aim is to work

towards improving cooperation in practice in the medium term.

Practical relevance also plays an important role. Therefore, research and practice are brought together in the Digital Hub Logistics. The support of the companies that are integrated into the innovation ecosystem, gives young scientists the opportunity to make direct contact with managers from industry in the context of excursions to companies, industry-meets-science workshops and live case studies. At the same time, the scientists have access to demonstration halls and test fields (see page 6) in the Digital Hub Logistics.

## EXEMPLARY TALENT DEVELOPMENT



The **Graduate School of Logistics (GSofLog)** offers an industry-funded Phd program. The model is based on a unique concept throughout Germany.



The **Research Training Group 2193** enables particularly qualified doctoral students from various disciplines to prepare their dissertations in the field of adaptation planning of factory systems.





## DEDICATED WORK FOR THE SUCCESS OF INNOVATION HUBS

### SUPPORTER



The **Digital Hub Logistics e.V.** also sends a clear signal for the logistics innovation ecosystem at the Dortmund location. Nearly 30 companies and organizations from the logistics, production and retail sectors have joined forces in the association. The members of the association have been instrumental in setting up the Digital Hub Logistics from the very beginning and support the activities of the hub with great commitment. Previously, the association had already supported the development and establishment of the office for International Data Spaces e. V.. The common

goal of the members is to drive forward the digital transformation in logistics. For this purpose, applied research, the development of innovations and the use of digital technologies in Germany and Europe are to be accelerated. The association's board includes representatives from Rhenus Logistics, duisport group/ Duisburg Port, Thyssen-Krupp Industrial Solutions, Economic Development Corporation Dortmund and Beumer Group, as well as the Fraunhofer Institute for Material Flow and Logistics IML.

### AMBASSADOR



Key potential of Digital Innovation Hubs (DIH) lies in efficient pan-European networking. In this context, the **DIHNET.EU** project aims to create a network of networks. The goal of the

project is to enable the coordination of European, national and regional initiatives that directly support digital transformation and Digital Innovation Hubs in Europe. As a result of winning the DIH Champions Challenge in 2019, the Digital Hub

Logistics is now one of the so-called "DIHNET Ambassadors". In this role, the Hub is committed to improving collaboration between the various players in the European DIH community. This contributes to helping DIHs communicate, coordinate,

collaborate and synchronize their activities. The aim is to create a community where interaction between nodes, information exchange and peer learning are part of everyday life.



# # CONTACT

KNOWLEDGE SHARING

TECHNOLOGIES TRANSFER

NEW BUSINESS OPPORTUNITIES

You are interested in the work of our technology-oriented and sectorial Digital Hub Logistics? Please, do not hesitate to contact us.

## Digital Hub Logistics

Emil-Figge-Straße 76  
D-44227 Dortmund

🌐 [www.digitalhublogistics.com](http://www.digitalhublogistics.com)

✉ [info@digitalhublogistics.com](mailto:info@digitalhublogistics.com)

🐦 [@DigiHubLog](https://twitter.com/DigiHubLog)

🌐 [linkedin.com/company/digital-hub-logistics](https://linkedin.com/company/digital-hub-logistics)



We are a fully operational Digital Innovation Hub DIH within the Digitising European Industry Initiative of the European Union.



The contents of this brochure can also be found on the Internet:  
[www.digitalhublogistics.com/ecosystem](http://www.digitalhublogistics.com/ecosystem)



We are part of the **Digital Hub Initiative** of the Federal Ministry for Economic Affairs and Energy.



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**DIGITAL.HUB**  
LOGISTICS