Who makes SMEs ready for the digital future?

it´s owl

The Technology-Network: Intelligent Technical Systems OstWestfalenLippe.Germany: www.its-owl.com

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WE ARE MOVING FORWARD. ARE YOU GOING TO JOIN US?

How will digital transformation change SMEs? How can we utilise new technologies to improve products, production methods and working conditions? How can we unlock new business potential? And what can we do to prepare young professionals and specialists for digital change?

Companies in the manufacturing industry are busy tackling these questions. In OstWestfalen-Lippe, we want to develop solutions to these challenges together. To this end, 200 companies, research institutes and organisations have teamed up in the technology network it's OWL. Named as one of the Leading-Edge Clusters by the Federal Ministry of Education and Research, it's OWL is considered to be one of the largest Industrie 4.0 initiatives for SMEs.

From 2012 to 2017, we developed specific solutions in 47 projects that companies were able to use to improve the reliability, resource efficiency and user-friendliness of their machines and systems. Small and medium-sized companies have also benefitted from this, mainly via an innovative transfer concept. In 171 transfer projects, they were able to resolve specific challenges in operations, and take their first steps on the road to Industrie 4.0.

Collaboration between industry and science is a model for success to ensure the competitiveness of manufacturing companies in OstWestfalenLippe and North Rhine-Westphalia. To this end, we develop new technologies, services, business models and qualification offers for SMEs. The state of North Rhine-Westphalia is providing EUR 50 million funding for projects, at least the same sum has been pledged by industry. We want to implement EUR 200 million worth of projects until 2022. Initial projects in artificial intelligence, digital platforms, digital twins and the work world of the future started in December 2018.

it's OWL is the leading network for SME digital transformation. Results from the Leading-Edge Cluster are converted into practical solutions. Here, you will find partners to share experience with, new technologies and ways to develop your specialists. And it is here where companies and research institutes offer you attractive working conditions and career options.

We are moving forward. Are you going to join us?

Prof. Dr.
Jürgen Gausemeier
Chairman of the cluster board

Hans Beckhoff
Managing Partner,
Beckhoff Automation GmbH,
Vice Chairman of the cluster board

Dr. Eduard Sailer
Managing Director (ret.), Miele,
Vice Chairman of the cluster board

ON THE ROAD TO BECOMING THE NO. 1 INDUSTRIAL CENTRE

Industry in North Rhine-Westphalia is and remains an important driver for economic development in Germany. Nowadays, industry means high-tech companies, state-of-the art, well-paid jobs, excellent training and future prospects for young people, as well as large investments, climate and environmental protection, and last but not least, frequent social commitment.

Top-class high-tech and digitalisation are the keys for the future of our economic area. That is why we are working shoulder to shoulder with industry, science and industrial service providers on key fields of innovation such as artificial intelligence, the Internet of Things and blockchain. Our objective is to turn North Rhine-Westphalia into the most innovative, efficient and environmentally-friendly industry location in the world.

For instance, this involves making research findings available to SMEs. Digital startups also have a crucial role to play. Not only because they might create "the next big thing", but also because they give a crucial impetus to existing companies in regard to digital transformation. It is all about understanding work and education in a new way, which is moving away from location and time constraints more and more over time. Possible ways to earn a living are even emerging for people who have struggled to find work up to now due to health, spatial or temporal barriers.

The technology network it's OWL is an outstanding example of how companies, universities and research institutes develop new technologies together on the road to "Industrie 4.0" - and successfully bring them to the SME sector. New approaches are emerging in research projects for machine learning platforms and the working world of the future but there are also concepts for start-ups and new partnerships between SMEs and company founders.

The federal government is providing funding totalling EUR 50 million for it's OWL's projects and EUR 3 million for the cluster management. it's OWL is the North Rhine-Westphalia beacon for innovation around the world. Furthermore, the network is making an important contribution to the competitiveness of our SME industry. We will make results and experience available for the companies throughout the state, such as via a technology platform, the initiative "Digital in NRW - competence for SMEs" and the Centre of Excellence for Artificial Intelligence.

Prof. Dr. Andreas Pinkwart
Minister of Economic Affairs, Innovation, Digitalization and Energy of the State of North Rhine-Westphalia

CLUSTER DEVELOPMENT

Over the last five years, it's OWL has established itself as a driver for competitiveness of the manufacturing industry in OstWestfalenLippe.

TECHNOLOGY LEADERS AND WORLD-CLASS RESEARCH

OstWestfalenLippe is among the strongest production areas in Europe, characterised by a high concentration of employment, capacity for innovation and export quota. The region has 400 companies in mechanical engineering, the electrical and electronics industry as well as the automotive supply industry, providing jobs for around 80,000 employees and generating annual revenue of EUR 17 billion.

The core of the cluster is made up of family-run businesses and a wide range of medium-sized firms. This includes numerous market leaders: strong brands such as Benteler, Claas, Diebold Nixdorf, DMG Mori, GEA, Hella, Hettich and Miele, but also lots of hidden champions such as Kannegiesser or WP Kemper. Beckhoff, Harting, KEB, Lenze, Phoenix Contact, Wago and Weidmüller set global standards in industrial electronics. In connection technology, they hold a world market share of 75 percent.

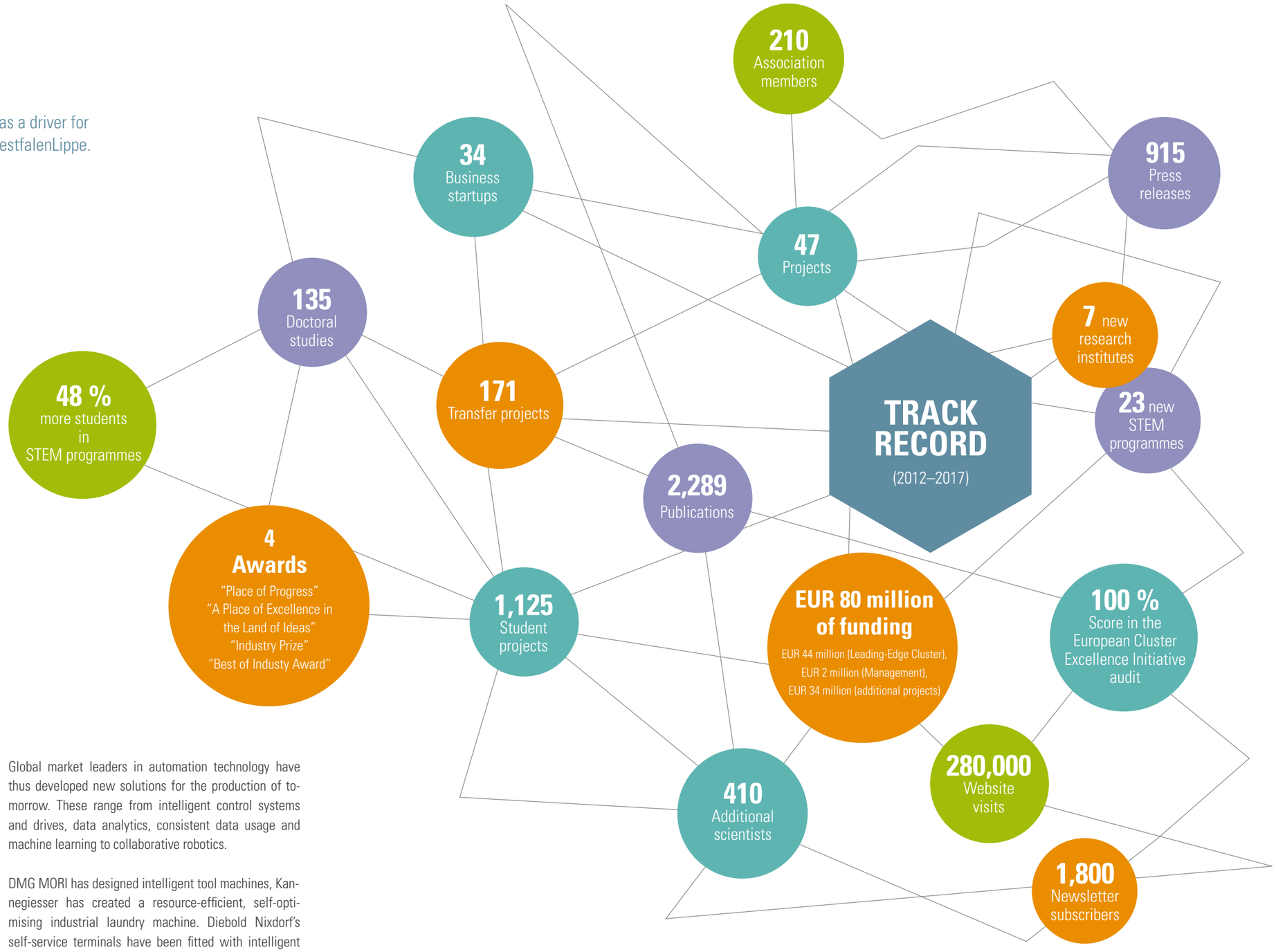
Regional universities and research institutes are a byword for top-class research areas such as artificial intelligence, industry automation, work 4.0 and Systems Engineering. Around 1000 scientists are working on the solutions of tomorrow in four special research areas, 18 research institutes and three Fraunhofer institutes. Universities offer over 20,000 students excellent training in STEM subjects.

SME SOLUTIONS FOR INDUSTRIE 4.0

47 projects were implemented from 2012 to 2017 in the context of it's OWL, supported by the Federal Ministry of Education and Research. In this respect, companies and research institutes have developed solutions that companies can use to improve the reliability, resource efficiency and user-friendliness of their devices, machines and systems.

Global market leaders in automation technology have thus developed new solutions for the production of tomorrow. These range from intelligent control systems and drives, data analytics, consistent data usage and machine learning to collaborative robotics.

DMG MORI has designed intelligent tool machines, Kannegiesser has created a resource-efficient, self-optimising industrial laundry machine. Diebold Nixdorf's self-service terminals have been fitted with intelligent



user interfaces. Claas has advanced agricultural machine networking and environment detection. Hella has developed intelligent headlights and improved the range of electric cars.

The basis for this were fundamental technologies that universities and research institutes used to make the results of top-class research available to companies. The focus here was on the topics of self-optimisation, human-machine interaction, intelligent networking, energy efficiency and Systems Engineering.

Mainly SMEs have benefitted from this thanks to an innovative transfer concept. In 171 transfer projects, they were able to resolve specific challenges in operations and take their first steps on the road to Industrie 4.0. The feedback is outstanding: 75 percent of companies are happy with the product schedule. 69 percent report that they have made significant advancements.

In the Work 4.0 model project, five companies tested the introduction of assistance systems in production, together with Germany's biggest metalworkers' union IG Metall. Top management, employees, the works council and trade union worked closely together in the process. Particular factors for success are a positive basic attitude towards digitisation, in-depth communication in companies and involving employees.

DRIVER FOR DEVELOPMENT OF OSTWESTFALENLIPPE

it's OWL is a powerful stimulus for competitiveness in the manufacturing industry in OstWestfalenLippe. Companies have created around 7,500 new jobs since the start of the Leading-Edge Cluster in 2012.

34 companies have been founded in the field of flexible production. This includes the Werkbliq servicing platform and verlinked GmbH, who are providing solutions for machine communication. Solihde is developing customised solutions for business process optimisation. And Assembly Solutions is designing tailor-made assistance systems for assembly and maintenance.

Seven research institutes have been created, including the Fraunhofer Institute for Mechatronic Systems Design (Paderborn) and the Fraunhofer IOSB - INA Industrial Automation Branch (Lemgo).

Furthermore, 23 new practical programmes have been created at the six universities by involving the business sector - several dual and vocational offerings included. The number of STEM students increased to 48 percent as a result.

STRATEGY 2018 TO 2022

The future lines of attack are as follows: more intelligence in machines and systems – unlocking business potential for companies.

INTELLIGENT TECHNICAL SYSTEMS

The it's OWL strategy is focused on developing solutions for intelligent products and production methods: Intelligent Technical Systems. They are created thanks to interaction between engineering sciences and IT, and are characterised by the following features:

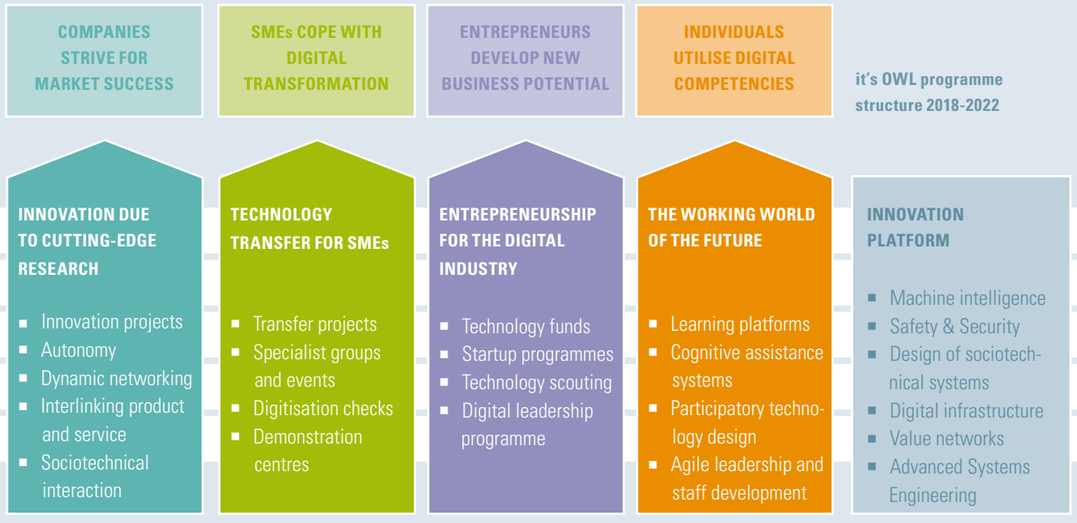
- They interact with their environment and adapt to it autonomously **(adaptive);**
- in a dynamic environment, they even cope with unexpected situations that were not considered by the developer **(robust);**
- they use knowledge gained through experience to anticipate the effects of different factors **(predictive);**
- they take different users' behaviour into account **(user-friendly).**

NEW CHALLENGES

Since it's OWL started, the technological environment and client requirements have changed. This presents new challenges to companies.

Autonomy: Autonomous machines and systems can even tackle complex tasks independently without human intervention. How can these systems be developed and how can technical challenges, as well as new legal and ethical issues, be addressed in a holistic manner?

Dynamic networking: Complex system networks are being created because of the increasing level of networking between machines and systems. What demands are put on technical systems that interact with one another?



Sociotechnical interaction: The increasing complexity of technical systems must not lead to increasing complexity in operation. What requirements are becoming apparent in terms of intuitive machine and system operation, and how are the needs of users being taken into account?

Interlinking product and service: Market services and business models are changing in the context of digitalisation. How are products changing and what additional services will clients expect in the future? What changes are emerging for existing business models, and how can they be extended to additional offerings?

INNOVATION PLATFORM FOR NEW TECHNOLOGIES

In order to prove and maintain technology leadership and competitiveness, companies have to improve the intelligence of their products and production methods, and unlock the potential benefits.

To this end, new fields of technology are being exploited in the technology network. This includes machine intelligence, designing sociotechnical systems, digital infrastructure, safety and security, value networks and advanced Systems Engineering. Basic technologies, solution models and software libraries are being developed in these areas, and being made available to companies in an innovation platform.

The basis for this are innovation projects from companies and research institutes, in which solutions are being developed for the challenges mentioned above (autonomy, dynamic networking, sociotechnical interaction, and interlinking product and service). For instance, this involves exploiting the potential success of digital platforms and methods of artificial intelligence, or setting up a technical infrastructure for digital twins.

TECHNOLOGY TRANSFER, ENTREPRENEURSHIP AND WORK 4.0

A crucial focus is technology transfer for SMEs. Together with a research institute, small and medium-sized companies are able to meet specific challenges of digital transformation in transfer projects. Furthermore, they can share ideas with other companies in specialist groups. Digitalisation checks are used to determine the optimisation potential for companies and to identify appropriate measures. Demonstration centres allow them to experience new technology applications.

Identifying new business ideas in the intelligent manufacturing sector, and developing them into promising business concepts is another focus topic. Startups are being supported, and collaboration with companies is being enhanced. Technologiefonds OWL enables access to growth capital.

Furthermore, by involving employees, practical solutions are being developed for the working world of the future to optimise working conditions and train employees. Topics in this regard are learning platforms, cognitive assistance systems, participatory technology design, as well as agile leadership and staff development.

Partnerships are also being sought after with international partners in all four programme areas. In this regard, the focus is on Canada, China, Finland, India, Japan, and the USA.

You can download the strategy at www.its-owl.de.

THE INNOVATION PLATFORM

Basic technologies, solution models and software libraries are being developed in six areas, and provided in a technology platform. Innovation projects implemented by companies and research institutes lay the foundation.

MACHINE INTELLIGENCE

During production process automation, machines are controlled by hardware and software in such a way that a process runs autonomously - this means without human intervention. Automation solutions that are available on the market can be used for processes that remain the same or are rigid.

At the next stage of automation, flexible and fluid processes are expected to run automatically without human intervention. Therefore, machines will be designed to set themselves up independently, enabling the production of different product variants. To do this, decisions that were previously made by humans will have to be illustrated using software. In this regard, technical systems that are able to handle problems in decision-making structures similar to humans will be required.

Intelligent behaviour is simulated using algorithms. A crucial requirement here is the ability to learn from past situations and to improve the process based on lessons learned.

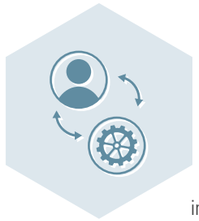
Machine intelligence methods enable companies to automate complex production processes allowing them to manufacture faster, more cost-efficiently and at a better quality. Production errors, operating faults and downtime are prevented. It is not just production processes but also products, such as intelligent household appliances, that can be optimised using machine intelligence: A vacuum cleaning robot developed by Miele can use machine intelligence to locate obstacles, to optimise its routes and to adapt to changing environmental conditions - a product function that creates added value for the client.

SAFETY & SECURITY

High demands are placed on safety and security due to increasing machine complexity and networking.

“Safety” is defined as the reliability and functionality of a system. For instance, this includes error-free machine operation, but also safe handling and use. “Security” designates system protection against unauthorised external access. To do this, companies require holistic safety concepts that do not have to be painstakingly redesigned each time in order for them to face obvious IT risks.

New methods for safety & security are being developed and used in the Leading-Edge Cluster. In this respect, Janz-Tec AG is developing a secure platform to safely store data in environments that are not trustworthy. Phoenix Contact is introducing new methods into its development processes to allow them to take security into account from the very start. In recognition of this, the business was certified by TÜV Süd according to IT safety standard IEC 62443-4-1.



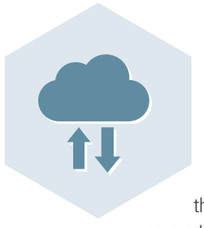
DESIGNING SOCIOTECHNICAL SYSTEMS

Sociotechnical systems where humans interact with a technical device are making our lives easier every day. Alexa, Google Assistant or Siri are examples of such systems that are increasingly finding their way into industry - in manufacturing as well as offices.

There are a lot of potential uses for intelligent assistance systems in industry. They may take the pressure off employees, not only during physically demanding work or routine tasks. In fact, they also offer support when setting up, maintaining and assembling machines and systems by making required information available on demand. Potential forms of interaction comprise speech recognition and voice control, augmented or virtual reality, gesture control or context recognition.

For example, a mechanic can see maintenance or repair notes for a machine via a pair of data glasses, which he can then implement directly on-site. Alternatively, when assembling complex devices, a screen shows workers which part they have to fit next. The assistance system automatically takes on a testing role in both cases.

When developing assistance systems, they have to be individually adapted to the respective application. A crucial factor for success here is involving employees at an early stage so that the systems can support future users in the best possible way. This is how machine and system user-friendliness as well as production process quality and efficiency can be improved. The focus, however, is not on technology, benefits for employees are always taken into account (cf. also the key topic of Work 4.0 on page 19).



DIGITAL INFRASTRUCTURE

Industrie 4.0 is aimed at ensuring that value chains are continually networked horizontally and vertically. This means that in-house business processes such as production, logistics and purchasing are networked with one another, and the same applies for the business with suppliers and clients. An order-driven production system should be gradually achieved as a result: a client order triggers product manufacture instantly.

Prerequisite is a reliable digital infrastructure. This includes, for example, powerful broadband, mainframes, secure networks and cloud services.

To do this, companies require a holistic strategy with an IT infrastructure that has been aligned to customised developments and needs. Furthermore, IT solutions must be flexibly configurable.

For instance, Plug-and-Produce approaches are being used to ensure that modules can be integrated into existing production lines without having to be set manually. Crucial success factors for digital infrastructures are uniform standards and adaptive solutions. Companies can leverage these, instead of developing customised individual solutions. This is how they can meet the requirements for a digital infrastructure that can be flexibly adapted to changes in their products and business models.

VALUE NETWORKS

Due to digital transformation, the term “value chain” no longer does justice to current developments. Added value is no longer a linear chain, it is an overarching network in which in-house teams, external partners, suppliers and clients can operate together in a flexible manner. Client requirements can thus be directly incorporated into product development and manufacture.

In the Leading-Edge Cluster it’s OWL, companies receive support in setting up new value networks. For instance, maturity level models are used to objectively assess competencies in Industrie 4.0 and to derive measures for improvement.

Another focus is on developing and introducing new business models. Platforms have an important role to play here.

They will shape markets in the production sector in a similar way to how Uber has changed passenger transport. Companies have to exploit the potential of platforms and offer services on them so as to not lose access to customers. Claas is one of the pioneers with its in-house 365FarmNet platform which shows what managing an agricultural business might look like in the future.

ADVANCED SYSTEMS ENGINEERING

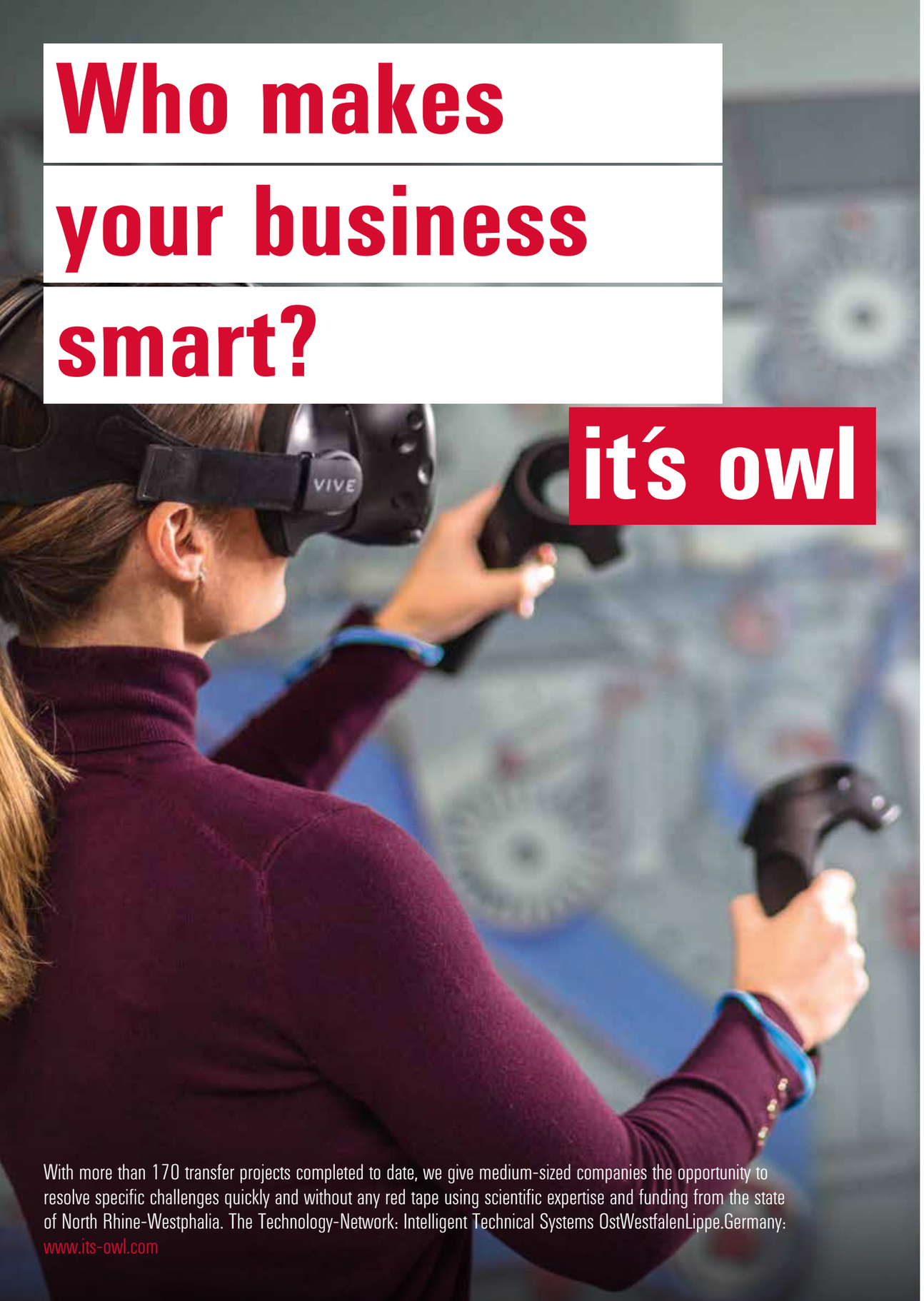
Digital transformation in industry is increasing complexity in product development: Intelligent products, combinations of products and services and value networks require close interaction between different specialist disciplines such as mechanical engineering, electrical engineering and control technology. This is also becoming more common in software technology. Advanced Systems Engineering interlinks these disciplines to observe product and production system as a unit throughout their entire life cycle. Information and communication technologies are increasingly being used in the process to improve development processes and tools.

New machines that are still at the development stage may thus be tested in a virtual production environment.

As a result, tests can be carried out at an early stage to see whether the requirements are being met, and whether all elements of the production line are interacting properly. Cluster companies such as Claas and Miele have recognised the importance of Systems Engineering for their in-house product development. They are actively reshaping the development process to be successful among global competitors in spite of increasing product and value-added process complexity.

It is not just the quality and efficiency of product development being improved and expedited thanks to new methods in Advanced Systems Engineering, the same is true for product quality and efficiency.

You can find innovation projects in which companies and research institutes are developing solutions in these fields of technology at **www.its-owl.com/projects.**



TECHNOLOGY TRANSFER

Small and medium-sized companies are able to resolve challenges of digital transformation in transfer projects.

Successful technology transfer to SMEs is it's OWL's unique selling point. In transfer projects with a university or research institute SMEs can utilize expertise, methods and technologies from the Leading-Edge Cluster to tackle specific challenges of digital transformation. Projects are straightforward to apply for and can be easily implemented. Their effects can be seen in operation straight away. Medium-sized companies can take important steps on the road to Industrie 4.0 in this way.

Transfer projects make a crucial contribution to digitalising processes, products and services. This includes, for example, intelligent machine and system networking and self-optimisation, IT security, designing human-machine interfaces, an efficient energy management system or new business models.

Small companies (up to 50 employees) may receive funding for up to 80% of the total costs for a transfer project, and medium-sized companies (up to 249 employees) for up to 60%. Two types of transfer projects can be carried out in the process: Analysis and design assignments for research institutes (max. amount of funding: EUR 20,000), as well as assignments for qualification and implementation (max. amount of funding: EUR 40,000).

A company can implement one project from each of the two sectors every year. In doing so, the projects can also build on each other or both variants can be combined.

The application with the research institute's offer is submitted to it's OWL Clustermanagement GmbH. After an assessment by it's OWL Clustermanagement GmbH and Project Management Jülich, a transfer voucher is issued, which is paid out after the project has been completed. Interested companies can get advice from it's OWL Clustermanagement GmbH and it's OWL transfer partners when developing the idea and matching with a research partner. it's OWL transfer partners are IHK Ostwestfalen, IHK Lippe, OWL Maschinenbau, InnoZent OWL and OWL GmbH.

More information and the application form can be found at www.its-owl.de/transfer.

»Collaborating with research institutes in transfer projects gives us the opportunity to think outside the box and see our business from another perspective, from the product to manufacturing to the business model.«

Ann-Catrin Schürer, Authorised Signatory at Bio-Circle Surface Technologies

»We have carried out three transfer projects with different research institutes. All three have led to clear improvements. For instance, our employees are being supported by an assistance system when assembling complex foot switches. We have also been able to convert our findings in wireless signal transfer into a new product.«

Marc Stanesby, Managing Director, steute Technologies

THE WORKING WORLD OF THE FUTURE

New technologies are being utilised to optimise working conditions and to take the pressure off of employees.

Information and communication technologies are changing production and development work. Algorithms assist in decision-making. Assistance systems support employees in setting up and maintaining machines and plants, as well as in assembly. Virtual prototypes can be tested in real production environments.

However, increasing emphasis is being placed on the social aspects of workplace design in the digital factory: Humans remain the core focus of technology. To design the workplaces of the future, companies have to take specific applications into account when introducing new technologies, as well as actively involve and train employees in the process.

In the technology network it's OWL, companies, universities and trade unions are developing and testing new solutions for digitalising the working world. This involves cognitive learning platforms, cognitive assistance systems, participatory technology design, as well as agile leadership and staff development. For example, Weidmüller is researching how augmented and virtual reality can be used in professional training to enable personalised learning. Several companies are developing a shared learning platform for cross-company employee training.

Results and experiences are being made available to cluster companies, particularly small and medium-sized enterprises. They can develop and introduce new approaches by means of state transfer vouchers in the process (cf. page 17).

Furthermore, the specialist competencies of companies, universities, research institutes and other organisations are pooled to train specialists and young professionals in new technologies. Therefore, training sessions and workshops are being organised. New fields of technology such as machine intelligence, designing sociotechnical systems, digital infrastructure, safety and security, value networks and advanced Systems Engineering will be in focus (see page 13 ff).

»The course in Systems Engineering is a good foundation for my future role. Here, we learn about methods for cross-departmental collaboration. The junior speakers also give us new insights into technical backgrounds. I also believe we give the junior scientists something in return as participants: Our many years of experience and practical relevance.«

Stephan Musiolik, KEB, participant in the staff development programme for experienced specialists 2016

ENTREPRENEURSHIP FOR THE DIGITAL INDUSTRY

it's OWL provides the best conditions for developing new business concepts. Startups are being supported.

Digital transformation is changing markets and business models. As a result, outstanding opportunities are on the horizon for startups to conquer new markets and to establish themselves. OstWestfalenLippe and the technology network it's OWL provide the perfect environment for this. Here, founders can receive extensive support from cluster partners and get access to potential customers, something which cannot be said for other German startup regions.

New approaches for intelligent production methods and smart services are emerging as a result of collaboration in the cluster and in projects. 30 new business ideas are set to be identified and developed into successful business concepts together with companies and universities until 2022. To that end, disrupt workshops are being organised by scientists, students and cluster companies. New participation models are being developed for startups.

Founders can receive extensive support from cluster partners when developing their business concept. For instance, the Innovation Lab OWL of the four state universities provides training and advice services. Incubators such as garage33 in Paderborn, Innovationszentrum on the Bielefeld campus, knOWLedgeCube on the Lemgo campus, Founders Foundation and Denkwerk Herford offer focused programmes and coworking spaces. The Technologiefonds OWL and Business Angels OWL enable access to growth capital. Startup Region_OWL is the regional network for startups and connects them with each other, as well as with other stakeholders in OstWestfalenLippe.

OUR RANGE OF SERVICES

it's OWL offers manufacturing companies comprehensive support for digital transformation ranging from events, training sessions, specialist groups, demonstration centres and quick checks, to transfer projects.

Interested parties find out about new research approaches and solutions for digital transformation, and network with cooperation partners from industry and research in around 30 events and workshops each year.

Training sessions impart knowledge about new technologies and their areas of application to employees. The Industrie 4.0 and Systems Engineering specialist groups allow for dialogue between companies as they discuss current developments in digital production.

In demonstration centres, companies also have the option to experience new technologies in practice, and discuss their own applications with experts from the research sector. Examples are SmartFactoryOWL of Ostwestfalen-Lippe University of Applied Sciences and Fraunhofer IOSB-INA in Lemgo, Bielefeld University's Human-Machine Interfaction Transfer Lab and the Systems Engineering Live Lab at Fraunhofer Institute for Mechatronic Systems Design in Paderborn.

By means of a self check in the form of an online questionnaire, companies can independently take stock of where their operations are in terms of digitalisation. In the context of a company's quick check, experts from it's OWL research institutes examine a company's production and highlight specific options for optimisation. They recommend solutions for implementation and facilitate contact with experts.

In transfer projects, small and medium-sized companies together with research institutes are able to meet specific challenges of digital transformation (see page 17). Startups and founders in the field of intelligent manufacturing receive support in developing their business concept, and gain access to potential clients in the network.

it's OWL also establishes contact to international partners in the focus regions Canada, China, Finland, India, Japan and USA.

Our range of services is provided by the cluster management and the Competence Centre "Digital in NRW", which is sponsored by the Federal Ministry for Economic Affairs and Energy.

More information at www.its-owl.com/services.

WHAT PEOPLE ARE SAYING

Leaders from industry, science and politics consider the technology network it's OWL to be a success story as industry and research are jointly unlocking the potential of digital transformation for SMEs.

»Cooperation is becoming ever more important in Europe in light of competition with Asia and America. In Brussels, it's OWL is considered to be an example of best practice, as industry and science are pooling their resources in one region and organise the transfer to small and medium-sized enterprises. We also have to use these approaches and experiences for collaboration between the member countries. Cluster companies and research institutes are outstanding partners for international R&D projects.«

Tomas Hedenborg, CEO of Fastems Oy and President of European Industrial Association Orgalime

»OstWestfalenLippe is a prominent region, in which family run businesses, research institutes and politics work together and actively shape the future. Together, highly motivated people are able to utilise the potential of digitalisation for new jobs and better working conditions. OWL is a role model for many regions in Germany."«

Joachim Gauck, Federal President (ret.) during his visit to the Leading-Edge Cluster it's OWL on 27 September 2016

»IG Metall wants to shape digitisation. We see it's OWL as a role model in this regard. The way businesses, works councils, employees and trade unions interact is unique. That's how they can strengthen business competitiveness, as well as create good jobs. We want to transfer these successful approaches all over Germany. it's OWL is like an echo of thunder.«

Christiane Benner, 2nd chairperson, IG Metall

»Pooling resources to occupy top positions in global competition – that's exactly what the Leading-Edge Cluster it's OWL is all about. We support this prominent network in which companies and research institutes tackle huge challenges together. As that's how we succeed in the future.«

Anja Karliczek, Federal Minister for Education and Research

»The electrical industry is the most important innovator and metronome for Industrie 4.0. As it is an "enabler", it delivers important preliminary work for machines and systems. At it's OWL, global market leaders in the automation industry are working closely with research institutes, and are developing needs-based solutions for SMEs across all user industries. In doing so, it's OWL is making an important contribution to ensuring Germany's competitiveness.«

Michael Ziesemer, President of the Electrical and Electronic Manufacturers' Association

» Germany is still internationally competitive, but intelligent technical systems for production and logistics must be researched and developed to ensure that German industry remains in the lead in the future. Excellent interaction between research and industry in the Leading-Edge Cluster it's OWL will make a crucial contribution to achieving the objective of Industrie 4.0!«

Prof. Dr. Otthein Herzog, Jacobs University Bremen (it's OWL Scientific Advisory Board)

THE EXPERTS ARE TAKING NOTICE OF IT'S OWL

Its activities are attracting great interest among decision-makers and experts in industry, science and politics.

The OWL group stand at Hannover Messe - organised by OstWestfalenLippe GmbH and OWL Maschinenbau - is the cluster's most important presentation in Germany. Around 40 companies, research institutes, startups and organisations present new approaches for intelligent products and production methods, smart services and the working world of the future on 650 m² of floor space in Hall 16 A04.

Experts from the network are popular speakers at national and international conferences such as the IEEE conferences. it's OWL is partner and impetus for events throughout Germany.

In politics, it's OWL is seen as a role model for other regions. For example, Federal Chancellor Angela Merkel, former Federal President Joachim Gauck, EU commissioners Günther Oettinger and Frans Timmermans as well as numerous ministers and other experts have been finding out about it's OWL's experiences and results.

Numerous international delegations have come to experience collaboration in the technology network it's OWL, as well as specific approaches for Industrie 4.0 in the SME sector. The focus here was on the EU, South-East Asia and North America.

At Hannover Messe, over 40 cluster partners were showing solutions for intelligent production, smart services and the working world of the future.

Collaboration within the cluster, and the transfer concept in particular, have been awarded numerous times. Examples are the Industry Prize by Huber Verlag für Neue Medien and second place for Maschinenmarkt's Best of Industry award 2017.

it's OWL's activities and results are also gaining enormous traction in the media. Over 250 contributions have been published in specialist and national media over the last five years. Frankfurter Allgemeine Zeitung, Welt, Wirtschaftswoche, Handelsblatt, Die Zeit, The Economist and Bloomberg have heaped praise on specific approaches from the technology network.

WHAT THE PRESS ARE SAYING

The technology network it's OWL is considered to be one of the largest initiatives for Industrie 4.0, and the region is seen as a very promising future location.
FAZ, 10 April 2015

The Offensives from East Westphalia.
The Huffington Post, 28 April 2015

There they have created a unique network that is already implementing how the German industry, will soon be producing, creating jobs and, that's right, prosperity.
Wirtschaftswoche, 19 June 2015

Some of the most cutting-edge German companies can be found in a cluster of little towns in the state of North Rhine-Westphalia. Companies, universities and research centers have created a hotbed of entrepreneurship and innovation unparalleled in Germany.
Handelsblatt Global Edition, 30 June 2015

Network of hidden champions. The success of this not entirely unique but most popular cluster is astounding.
FAZ, 1 July 2015

Federal President Joachim Gauck has been finding out about digitalising the working world during a visit to Ostwestfalen-Lippe.
bild.de, 27 September 2016

it's OWL is a driver for success.
focus.de, 19 January 2017

It is not just the stereotypical German factories that are hellbent on modernisation. In the northern region of Ostwestfalen Lippe, driving past small towns and farms, Merkel's fourth industrial revolution is taking hold in unexpected quarters.
Bloomberg, 8 July 2017

What Bitkom experts are calling for is right at the forefront of the new it's OWL strategy concept: We want to get more involved in client platforms, network intelligent machines, and forge closer ties with clients.
FAZ, 28 November 2017

CLUSTER BOARD

The cluster board is the governing body for it's OWL e.V., the sole cluster management shareholder, and guides it's OWL's strategic alignment. In the process, advice is sought from the scientific advisory board, comprising four renowned researchers. (as of 1 January 2019)

CLUSTER BOARD MEMBERS

Hans Beckhoff
Managing Partner, Beckhoff Automation GmbH & Co. KG
(Vice Chariman)

Sven Hohorst
Managing Partner, Wago Kontakt-technik GmbH & Co. KG

Roland Bent
Managing Director, Phoenix Contact GmbH & Co. KG

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Oliver Lang
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Miele & Cie. KG

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Lenze SE

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Manfred Müller
Chairman of the Shareholders' Meeting, OstWestfalenLippe GmbH

Dr. Dietmar Harting
Individually liable partner, Chairman of Future Development and New Technologies, Harting KgAA

Prof. Dr. Birgitt Riegraf
President,
Paderborn University

Prof. Dr.
Gerhard Sagerer
Rector, Bielefeld University

Jörg Timmermann
CEO,
Weidmüller Group

Dr. Eduard Sailer
Executive Director (ret.), Miele & Cie. KG,
(Vice Chairman)

SCIENTIFIC ADVISORY BOARD MEMBERS

Prof. Dr.
Ingeborg Schramm-Wölk
President, University of Applied Sciences Bielefeld

Prof. em. Dr.
Otthein Herzog
Jacobs University Bremen

Herbert Sommer
Chairman of the Shareholders' Meeting (ret.), OstWestfalenLippe GmbH

Prof. Dr.
Edgar Körner
Honda Research Institute Europe GmbH

Karl-Heinz Stiller
Chairman of the Supervisory Board (ret.), Wincor Nixdorf AG

Prof. Dr.-Ing. Dr. h.c.
Manfred Nagl
RWTH Aachen

Hans-Dieter Tenhaef
Board spokesman,
OWL Maschinenbau

Prof. Dr. Ir.
Fred J. A. M. van Houten
University of Twente

Marianne Thomann-Stahl
President, District Government Detmold

Experts from companies, research institutes and business-related organisations assist the cluster management company in developing and implementing activities. They get involved in the working committee (product development), the marketing team and the transfer group. The members can be found at **www.its-owl.com.**

IT'S OWL E. V.

it's OWL e. V. pools the interests of cluster partners. Other companies, scientific institutions and business-related organisations can join.

COMPANIES

UNIVERSITIES AND RESEARCH INSTITUTES

TRANSFER PARTNERS

SPONSOR MEMBERS

More than 150 sponsor members - particularly SMEs - are utilising the Leading-Edge Cluster's range of services to network and get their companies ready for digital transformation. Interested companies, scientific institutions and business-related organisations are more than welcome to get involved with the Leading-Edge Cluster and join the association. For information on the association (charter, membership fee regulations and membership declaration) as well as other partners, go to **www.its-owl.com/partners.**

achelos GmbH I AGOFORM GmbH I amixon® Ruberg-Mischtechnik GmbH + Co. KG I ARI-Armaturen Albert Richter GmbH & Co. KG I Arntz Beteiligungs GmbH & Co. KG I arvato Systems GmbH I ASM SyncroTec GmbH I battenfeld-cincinnati Germany GmbH I BE Bauelemente GmbH I BELU GmbH I Berg & Co. GmbH I BERNSTEIN AG I BeSte Stadtwerke GmbH I Betron Control Systems GmbH I Bette GmbH & Co. KG I Bio-Circle Surface Technology GmbH I Böllhoff Automation GmbH I Bosse Design GmbH & Co. KG I BOW Bildungswerk der ostwestfälisch-lippischen Wirtschaft e. V. I BREKOM GmbH I Brockbals GmbH I BST eltromat International GmbH I Centroplast Engineering Plastics GmbH I Ceres Vision GmbH I Clarion Events Deutschland GmbH I Condor GmbH Medicaltechnik I Coveris Flexibles Deutschland GmbH I CP contech electronic GmbH I DMW Schwarze GmbH + Co. Industrietore KG I dSPACE GmbH I Dürkopp Adler AG I Düspohl Maschinenbau GmbH I ELHA-Maschinenbau Liemke KG I Emmet Software Labs GmbH & Co. KG I Ferrocontrol Steuerungssysteme GmbH & Co. KG I Fischer Information Technology AG I FISCHER Mess- und Regeltechnik GmbH I Freund Maschinenfabrik GmbH I Friedrich Remmert GmbH I FTC3D GmbH I G. Kraft Maschinenbau GmbH I Gebr. Brasseler GmbH & Co. KG I gpdm - Gesellschaft für Projektierungs- und Dienstleistungsmanagement mbh I Häfner & Krullmann GmbH I Handwerkskammer Ostwestfalen-Lippe zu Bielefeld I Hanning ElektroWerke GmbH & Co. KG I Haver + Boecker OHG I Heinz Schwarz GmbH & Co. KG I helectronics GmbH I HOMAG Kantentechnik GmbH I HOMAG Bohrsysteme GmbH I HumanTec GmbH I IHC Industrie- und Handelsclub Ostwestfalen-Lippe e. V. I IMA Klessmann GmbH I Initiative für Beschäftigung OWL e. V. I InnoME GmbH I Innovative Optoelektronik und Steuerungssysteme IOS GmbH I INTEG GmbH I ISI Automation GmbH & Co. KG I ISRINGHAUSEN GmbH & Co. KG I itemis AG I Janz Tec AG I Josef Schulte GmbH I Jowat SE I Jürgenhake Gesellschaft für Kabelkonfektion und Metallverarbeitung mbH I K4A Systems GmbH I Kaimann GmbH I Kolbus GmbH & Co. KG I Krause DiMaTec GmbH I Krause-Biagosch GmbH I Kreis Paderborn I L&R Montagetechnik GmbH I LaVision BioTec GmbH I Lebenshilfe für Menschen mit Behinderung, Kreisvereinigung Detmold e. V. I Lynx-Consulting GmbH I MADLEHN GmbH I Melitta Europa GmbH & Co. KG I Melos GmbH I Minda Industrieanlagen GmbH I MIT I MSF-Vathauer Antriebstechnik GmbH I Müller-Elektronik GmbH & Co. KG I Neuland-Medien GmbH & Co. KG I OWL Kompetenzzentrum für Virtual Prototyping & Simulation e. V. (ViProSim) I Paderborner Kühlhaus GmbH & Co. KG I Paul Henrichs KG I PerFact Innovation GmbH & Co. KG I Peter-Lacke Holding GmbH I Phoenix Contact Electronics GmbH I Phoenix Contact Software GmbH I Piening GmbH I Plastikpack GmbH I Poppe + Potthoff Präzisionsstahlrohre GmbH I POS Tuning Udo Vosshenrich GmbH & Co. KG I RAUTEC Automatisierungs- und Prozessleittechnik GmbH I Resolto Informatik GmbH I RK Rose + Krieger GmbH I Robiotic GmbH I Rollax GmbH & Co. KG I RTB GmbH & Co. KG I SALT AND PEPPER Technology GmbH & Co. KG I Sandvik High Precision Tube GmbH I Scenario Management International (ScMI) AG I Schüco International KG I Schwering & Hasse Elektrodraht GmbH I SDI Innovation GmbH I SIEVERS-Group I Simonswerk GmbH I Smart Mechatronics GmbH I SMC Deutschland GmbH I SOLIHDE GmbH I Spier GmbH & Co. Fahrzeugwerk KG I ST Vitrinen Trautmann GmbH & Co. KG I Stadtwerke Lemgo GmbH I Starrag Technology GmbH I Steinbach AG I Steinel GmbH I Steinhaus Informationssysteme GmbH I steute Schaltgeräte GmbH & Co. KG I Stiegelmeyer GmbH & Co. KG I Strothmann Machines & Handling GmbH I Stükerjürgen Aerospace Composites GmbH & Co. KG I Symbic GmbH I symmedia GmbH I Syskoplan GmbH & Co. KG I Teu2tec GmbH I teuto.tech GmbH I TK-Oberfläche GmbH I topocare GmbH I TRiLUX GmbH & Co. KG I TSC Fachanwälte für Arbeitsrecht I TURCK Electronics GmbH I Venjakob Maschinenbau GmbH & Co. KG I verlinked GmbH I Wächter Packautomatik GmbH & Co. KG I WDB Systemtechnik GmbH I Weber Maschinenbau GmbH Breidenbach I Wemhöner Surface Technologies GmbH & Co. KG I WERKBLIQ GmbH I Werkstatt Begatal Lebenshilfe Lemgo e. V. I Werthenbach Hydraulik Antriebstechnik GmbH I Westaflexwerk GmbH I Westfalen Weser Netz GmbH I WestfalenWIND GmbH I WESTFALIA-Automotive GmbH I Willert Software Tools GmbH (as of 1 January 2019)

CLUSTER MANAGEMENT

The role of the cluster management is to implement the strategy, develop projects and services for cluster partners and to organise events, as well as marketing and PR.

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Sponsored by:

Ministry of Economic Affairs, Innovation, Digitalization and Energy of the State of North Rhine-Westphalia

The region:

OWL OstWestfalenLippe
Eine Region. Ein Wort.

UNLOCKING NEW CLIENTS AND MARKETS ON PLATFORMS

Project: Digital Business (DigiBus)
Project duration: 1/11/2018 to 30/11/2020
Project volume: EUR 2.77 million

Digital platforms such as Amazon, Uber and Airbnb have changed the B2C market. This change is increasingly coming up to B2B markets as well. As a result, digital platforms are being created in agriculture, as well as in mechanical and systems engineering, such as 365FarmNet or ADAMOS, a software platform for digital production. In order to stay competitive and to generate revenue that goes beyond the mere sale of products, manufacturing companies must increasingly interlink their products with services. Digital platforms allow them to offer customers a comprehensive solution, from incoming orders, to production and logistics. Innovative solutions that offer clients added value and create an appropriate willingness to pay, are the prerequisite. However, entering platform business is difficult for companies and raises various questions.

The project objective is to exploit the potential of digital platforms for businesses. The following will be determined in the process: what products and services are appropriate for the platform business, how existing platforms can be used, and what changes have to be made in companies. Various reference platform strategies are being developed for SMEs, based on a platform radar. A manual supports companies in developing their own individual strategy. Role profiles and organisational structures, which are required when setting up a platform, are being developed as part of the application design.

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Project partners: DENIOS · Fraunhofer IEM · GEA · UNITY Consulting & Innovation · Universität Paderborn · WAGO

DESIGNING THE WORKING WORLD OF THE FUTURE – IN CONSULTATION WITH THE WORKS COUNCIL AND THE WORKFORCE

Project: Work 4.0 I Needs Analysis and Offers for Manufacturing Companies (AWARE)
Project duration: 1/12/2018 to 30/11/2020
Project volume: EUR 1,79 Mio. Euro

Information and communication technologies are increasingly finding their way into the working world. This affects production work (e.g. using tablets to support work processes), as well as knowledge and development work, which is increasingly faced with work that is distributed in terms of time and space, as well as with products that are becoming ever more complex. The digitalisation of work is shifting the focus towards the social aspects of workplace design. This is why companies need to actively involve their employees in the change to digitalisation, to adapt their working conditions and qualifications as well as to implement changes in the working world together with corporate co-determination committees.

Business objectives and employee needs must be reconciled in the process. The project objective is to develop the potential of digitalisation for the working world in a considerate way that is focused on adding value. In this respect, the projects aims at striking a balance between technical options, organisational design and change communication, as well as implications for employees and their active involvement. To that end, results from research are transferred to operational application as a model for businesses. Topics such as cognitive assistance systems, participatory technology design, learning and teaching platforms are covered here, as well as agile leadership and staff development.

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Project partners: FH Bielefeld University of Applied Sciences · Fraunhofer IEM · Fraunhofer IOSB-INA · Hochschule Ostwestfalen-Lippe University of Applied Sciences · it's owl · Universität Bielefeld · Universität Paderborn · Benteler makes it happen · Hettich · Lenze · Miele · Rexroth Bosch Group · Weidmüller

Who makes SMEs ready for the digital future?

it's owl

PROJECTS 2018

The Technology-Network: Intelligent Technical Systems OstWestfalenLippe.Germany: www.its-owl.com

PROJECTS 2018

To remain competitive, companies need to increase intelligence in their products and production processes and open up new customer access channels. To do this, businesses and research institutes in the technology network it's OWL are jointly developing new fundamental technologies, reusable solution models and software libraries. Overall, with the support of state, federal and EU governments, projects worth EUR 200 million are to be implemented until 2022. As a first step, five lead projects totalling EUR 15 million have been launched, starting in December 2018. The key topics are machine learning, big data, digital twins, digital platforms and the working world of the future.

Project results and experiences are being incorporated into the it's OWL innovation platform and are being made available to cluster companies. Events and specialist groups offer the opportunity to obtain information and share experience. In cooperation with a research institute, small and medium-sized companies can utilise findings to tackle specific challenges in operation with state funding. Technologies and fields of application are being showcased in demonstration centres and labs.

Sponsored by:
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PROCESSING LARGE VOLUMES OF DATA AND DEVELOPING SERVICES

Project: Industrial Automation Platform for Big Data (iAP)
Project duration: 1/12/2018 to 30/11/2020
Project volume: EUR 2.04 million

The metaphor that "data is the 21st century's oil" epitomises the importance of collecting and interpreting data in the era of Industrie 4.0 and the Internet of Things. This data analysis is a crucial component of the business model at many technology companies such as Google or Facebook. Manufacturing companies also have to use data's value creation potential to stay competitive.

The project objective is to develop IT platforms and building blocks, which can be used to collect, transport and store data in production systems in line with demand.

Based on that, data-based services should be derived and designed, which are required for efficient machine and system operation or manufacture. A software for production control or a system for energy monitoring are examples of potential solutions. Methods that draw on artificial intelligence are being utilised for predictive maintenance, predictive quality or condition monitoring. Architectures, technologies and software functions that are required for setting up and operating relevant services will be developed in the project. Here, individual businesses are implementing various pilot applications that show the process mechanisms of automated data acquisition.

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Project partners: BENTELER makes it happen · Fraunhofer IEM · Fraunhofer IOSB-INA · Hochschule Ostwestfalen-Lippe University of Applied Sciences · KEB · Lenze · Universität Paderborn · Weidmüller

MAKING MACHINE LEARNING SUSTAINABLY AVAILABLE

Project: Machine Learning for Production and its Products (MI4Pro2)
Project duration: 1/12/2018 to 30/11/2021
Project volume: EUR 5.38 million

Thanks to machine learning (ML), knowledge can be generated from data to create added value at all levels of business processes. Products such as mobile platforms, robots or vehicles are utilising data to optimise their behaviour. However, production systems are also drawing on it more and more often in order to enable them to react to new market developments and client needs in a more agile manner, and to manufacture the best products using available resources. In the process, using ML methods close to the source of data is especially promising.

The project objective is to make ML available for intelligent products and production methods.

To that end, state-of-the-art ML methods are expected to be integrated into products and production chains. The project is also about increasing business awareness of how to utilise ML for agile business models. The main areas of focus are hybrid learning methods, integration of expert knowledge, data interpretability, learning from data streams, as well as Cognitive Edge Computing. ML methods are considered across applications, using three industrial use cases: State monitoring, process optimisation and product quality improvement. Results and methods are made available to companies on a ML platform. For instance, this platform consists of reference implementations, data preparation and data visualisation methods as well as application knowledge on typical processes when using ML methods.

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Project partners: BENTELER makes it happen · FH Bielefeld University of Applied Sciences · Fraunhofer IEM · Fraunhofer IOSB-INA · HANNING ELEKTRO-WERKE · HESSE MECHATRONICS · Hochschule Ostwestfalen-Lippe University of Applied Sciences · Lenze · Miele · Universität Bielefeld · Weidmüller

ACHIEVING POTENTIAL FOR SAVINGS WITH DIGITAL TWINS

Project: Technical Infrastructure for Digital Twins (TeDZ)
Project duration: 1/12/2018 to 30/5/2021
Project volume: EUR 2.6 million

Industrie 4.0 is based on sharing information that is interoperable, and that can be interpreted automatically. In this respect, there is great potential to enhance efficiency and flexibility by improving networking of the individual phases of the life cycle: from product development and production planning, to operation and service, to disposal. Data and models are already emerging along the life cycle, such as CAD and simulation models, configurations for machines or optimisation of resource consumption. However, they occur in different data formats with a different data structure and in different tools. Digital twins are expected to allow for a comprehensive view of products throughout their life cycle in the future.

The project objective is to develop and test a technical infrastructure for digital twins. This interoperable, consistent infrastructure is expected to enable efficient access to digital descriptions and submodels of machines, products and operating equipment, as well as to enable their interaction throughout their entire life cycle. Potential savings of over 50% are likely to be achieved as a result. The technical infrastructure is based on information models, interfaces and appropriate communication protocols. Requirements from the energy and manufacturing technology sectors, as well as existing Industrie 4.0 standards and IT systems such as PLM, ERP, MES or PIM and simulation systems are taken into account in the process.

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Project partners: Fraunhofer IOSB-INA · Hochschule Ostwestfalen-Lippe University of Applied Sciences · KEB · Lenze · PHOENIX CONTACT · Rexroth Bosch Group · Weidmüller