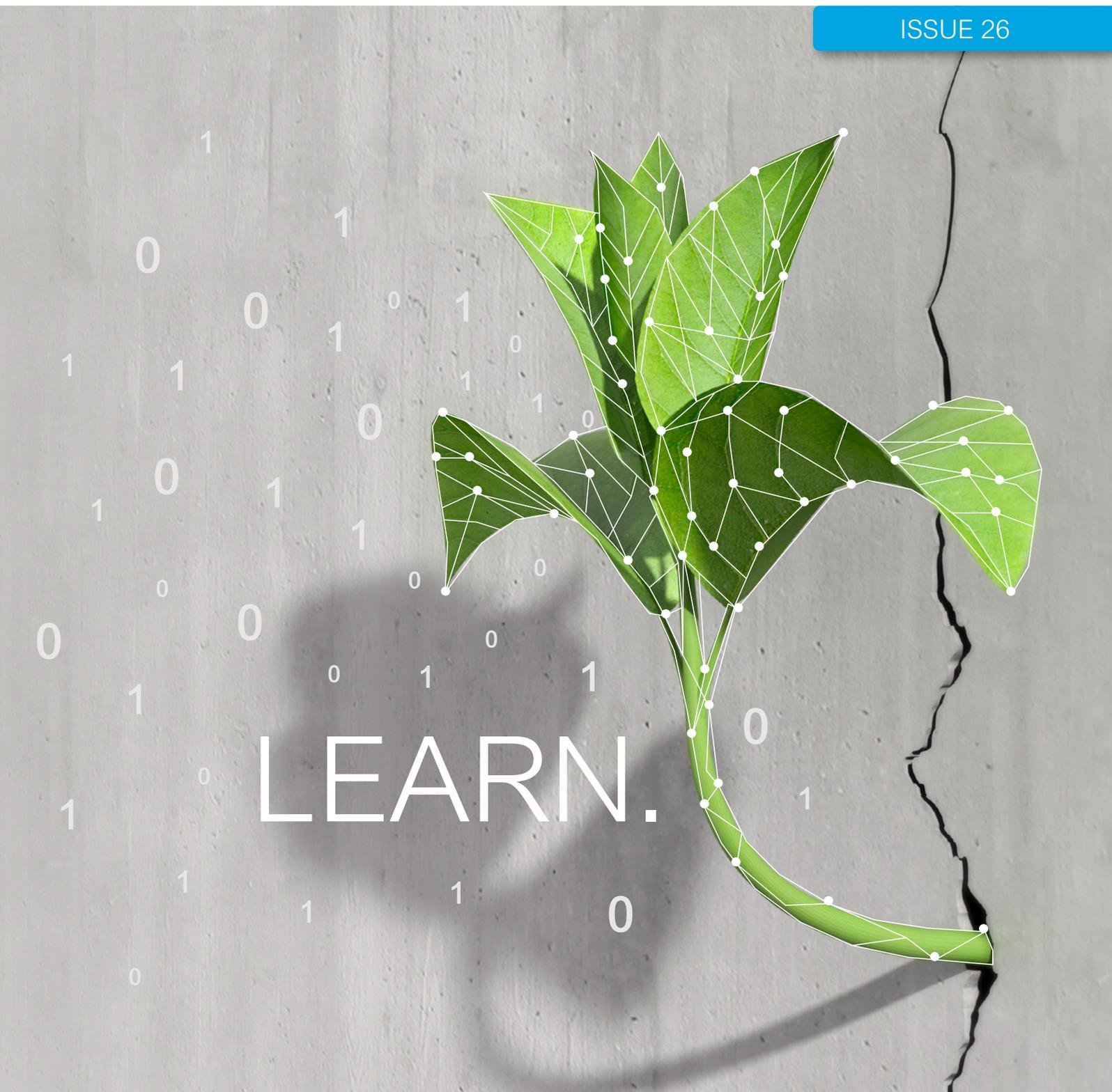


slashUp

Collaborative learning with software-defined products

ISSUE 26



LEARN.



Hanna Pfaff & Lena Sieber
Editor team

Dear reader,

Continuous learning is the key to success in a fast-moving world. We are pleased to present the 26th edition of slashUp, created in collaboration with the expert teams at doubleSlash.

Learning is not only human – companies, machines and products are also capable of learning. Welcome to the era of the software-defined product: a product that continuously evolves and adapts to changing user requirements. In this issue, we show how collaborative learning can drive positive change in your business. From connected mobility to data-driven services and subscription management, we present an inspiring collection of current trends and topics. Find out how companies are getting innovative through software-defined products and optimally tailoring their products to the needs of their customers. Also discover how machine learning and artificial intelligence are likely to impact the future of software-defined products.

Ready to embark on a shared journey of learning?

Start at the beginning or dive in wherever you feel like. You'll find plenty of valuable insights and ideas for continuing your own personal learning journey.

We hope you enjoy reading.

Overview

- | | | | |
|-----------|--|-----------|---|
| 3 | Software-Defined Everything
Continuous learning: Succeeding in the digital world | 14 | Subscription Management
From sales to dialogue: What we can learn from the subscription economy |
| 6 | Software Factory
Thinking, acting and learning together | 16 | Data-Driven Services
Learning more effectively with data products |
| 7 | Digital Sustainability
Green by IT – How does sustainable software development work? | 18 | Digitalisation of Medical Technology
Learning from data through usage analytics |
| 8 | Catena-X
A new dimension in the value chain of the automotive industry | 20 | Connected Things
AI-based fault detection and maintenance planning in action |
| 10 | Connected Mobility
Personalised services revolutionise the mobility of the future | 22 | Business Filemanager
It does work: Connect the disconnected |
| 12 | Learning Cycle of products
How data improves products | 23 | doubleSlash Insights
Professional development in a learning organisation |

Continuous learning: Succeeding in the digital world

It is essential to continuously learn and evolve in a world that is changing faster and faster. This is true not only for us as individuals and the organisations we work in. It is also true for products that need to adapt more quickly to the needs of their users. We live in an age in which technology plays an ever greater role in our daily lives. The ability to react quickly and flexibly to new developments has become a key competitive advantage.

The art of learning: How humans absorb and process knowledge

To get a basic understanding of the learning process, let's start by looking at how people learn. Human learning is the acquisition of new skills and knowledge and the deepening of existing ones. Learning is therefore invaluable in helping us to develop in life.

Perception plays an important role in human learning. We observe the environment and gather the information we need for learning through all our senses. In the next step, we compare what we have observed with our expectations and beliefs (target/actual comparison). Based on this comparison, we decide – consciously or subconsciously – whether we need to adjust our behaviour to achieve better results.

Step by step towards a learning organisation

It is not just people who are becoming more aware of the value of learning. Organisations are also recognising their role as learning organisations. They grow from their experiences and use existing data to continuously improve and evolve. Companies like these create a culture that encourages a solution-oriented approach and the expansion of knowledge and skills. By continuously learning and adapting, they can improve their competitiveness. Certain factors are critical in establishing a learning organisation:

- > **Learning culture:** A culture of learning must be an integral part of the organisation. Companies need to have a positive attitude toward change and learning, and foster a culture where it's OK to make mistakes. They need to create

an environment that enables employees to continuously expand their skills and knowledge, and to develop the confidence to accept the positive sides of failure.

- > **Feedback mechanisms:** A learning organisation requires feedback mechanisms that allow employees to evaluate their performance and learn from each other. Various measures can be used, such as regular performance evaluations, peer reviews or simple information sharing.
- > **Data analysis:** A learning organisation needs to use data to evaluate and improve its performance. This can be done by analysing customer feedback, financial data or other relevant metrics.
- > **Flexibility:** A learning organisation must be open to change based on experience and continuous observation. The organisation must be willing to adapt its processes, products and services to achieve better results.
- > **Collaboration:** In a learning organisation, collaboration and dialogue between employees is encouraged to support and learn from each other.

All of these factors contribute to a company becoming a learning organization, willing to continuously develop and improve. This leads to increased motivation and job satisfaction in the workplace and improved customer satisfaction – key competitive advantages that ensure future business success.

How machines learn

The concept of learning as applied to humans and learning organisations can also be applied to machines. In machine learning,

perception occurs through the processing of data. Based on the data, a model is trained that controls the behaviour of the machine. During the training process, the model compares its predictions with the actual results and adapts accordingly. Ultimately the model is used to make decisions and perform actions. Machine learning allows systems to become increasingly accurate and thus more efficient.

Imagine this: Every action produces a reaction that can be perceived. The perceived response is evaluated. Further actions are adapted on this basis. This process can be applied to human and organisational learning as well as in machine learning.

Machine learning can be divided into two main areas: supervised and unsupervised learning. Supervised learning uses labelled data where the input and output variables are known.

The goal is to develop a model that can accurately predict the output of the system given new inputs.

Unsupervised learning, on the other hand, uses unlabelled data where the output variables are unknown. The goal is to identify patterns or structures in the data without

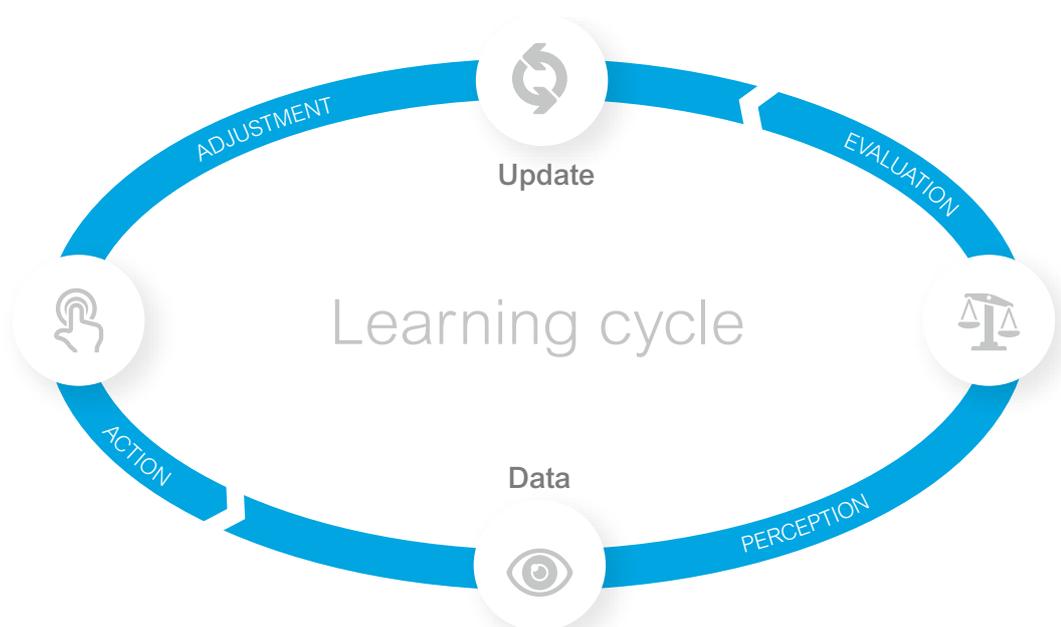
requiring the model to know in advance what categories or labels exist.

Both approaches have their own specific applications and are useful in different situations. The supervised learning model is often used for predictive tasks such as classification and regression, while the goal of unsupervised learning is to gain insight from the data without making an explicit prediction.

A very prominent example of supervised learning is ChatGPT, which was trained using billions of texts from a variety of sources. During the training phase, the data was compiled and cleaned by people with different backgrounds and perspectives. This was to ensure that ChatGPT developed a broad understanding of the world and the language. Although ChatGPT was supervised during its training, it can also work with unsupervised learning techniques, such as clustering or anomaly detection, to identify patterns and trends in large data sets. However, answers to questions are still reviewed and validated by humans to ensure that they are accurate and ethically appropriate.

Ethical considerations are of great importance in machine learning.

The learning cycle in four stages - the path to successful learning



Like human learning, a machine's behaviour depends on the data it receives. Incorrect or ethically questionable data can cause the system to learn incorrectly and make the wrong decisions. Companies therefore have a special responsibility to ensure that the data used for machine learning is accurate and ethical.

Machine learning and software development are closely related, since machine learning enables software to learn from data and make decisions. In the fast-paced technology industry, it is essential that software is also constantly evolving. Any new software version is the result of a continuous learning process.

Ethics are of great importance when it comes to machine learning.

This learning cycle makes it possible to react quickly to new requirements and developments, keep products up to date and secure a competitive advantage. Although the processes of human, organisational and machine learning differ, they have one thing in common: they all require efficient processing of data and adaptation of behaviour to achieve better results.

The link between learning culture, product development and business success in the digital world

To sum things up, learning plays a crucial role in our ever-changing and increasingly complex world – for companies, for their employees and also for their products. It enables us to meet new challenges successfully. It is therefore vital that we continue to learn and develop – not only as individuals and organisations, but also in terms of our products.

It is important to understand how the culture and concepts of learning in different areas interact and how they influence each other. The result: the best product with the best features and the best service delivered by the best people.

As a software company, we understand the importance of continuous development and of keeping our products up to date. We consistently make sure that our solutions are developed ethically and responsibly. We see it as our responsibility to ensure that technology does not cause harm but adds value to society and the economy.

We are constantly guided by our vision of "Digital Products for a better life".

We hope this article has given you a greater insight into the importance of continuous learning and inspired you to incorporate it even more actively into your product development process. We believe that learning is the key not only to personal and professional growth, but also to making your products more competitive.



Konrad Krafft
Founder of doubleSlash

Source:

> <https://www.golem.de/news/kuenstliche-intelligenz-so-funktioniert-chatgpt-2302-171644.html>

Thinking, acting and learning together

In a fast-paced, competitive world, the benefits of technology need to be maximised in order to be successful. Software development plays a crucial role in this context and is part of a continuous learning process. But how can this learning process become faster and more effective? The answer lies in collaboration, knowledge sharing, different perspectives and areas of expertise. When people with different backgrounds and skills work together, new ideas and approaches emerge, resulting in outstanding products.

Making knowledge explicit

Sharing knowledge is key to successful collaboration. A good collaboration model systematically promotes the continuous exchange of information and the growth of knowledge. Regular meetings and effective communication help to discuss successes, questions or problems. Our product teams exchange information continuously at all levels and relevant information is stored in a knowledge database. Shared learning requires transparency in the form of tangibly documented knowledge that can be shared with employees, customers and suppliers.

At doubleSlash, cross-project insights and practical artefacts are collected in the Software Creation Chain (SCC). These can be reusable software artefacts, best practices and checklists, as well as document artefacts (such as templates). These elements are continuously enriched with newly acquired knowledge and are available for all product developments and projects. They make it possible to get on board quickly at any stage of a project. And learning outcomes are not just stored in people's heads but are also available in the system for everyone to access.

Collaboration improves software development

The software product is always viewed holistically across the BizDevOps environment. This breaks down the silos between the different areas and unites multiple teams into one product team with a shared goal.

Communication becomes more effective, collaboration and integration are optimised, and a platform for shared learning is created.

- > **The business level (Biz)** creates a shared product vision. Exploration artefacts from the SCC are used.
- > **Development (Dev)** creates usable product increments. Continuous feedback loops ensure that everyone stays focused on the shared goal.
- > **The operations level (Ops)** focuses on the stability of the software product. Software products are constantly evolving: the OPS level ensures that systems run without errors and that problems are solved in cooperation with the other levels.

An iterative approach at all levels, close collaboration between the product team and the customer, and continuous learning ensure that the software product is on the pulse of the latest trends and solves the 'right' problems.

Together, we form the basis for a sustainable software product lifecycle and create added value for all stakeholders.



Stefanie Scharmman
Project manager in the
Software Sector

- > [Find out more about how we work](#)

Green by IT – How does sustainable software development work?

Digital products for a better life – this is our vision. And we see it as our responsibility to make digitalisation sustainable. As a software company, sustainability for us means first and foremost developing high-quality digital products with long-lasting benefits – and using resources responsibly. This applies to the entire software lifecycle, from design to operation.

Together with our customers, we develop digital solutions that are perfectly tailored to their individual requirements and strategies. What we bring to the table is our expertise in digitalisation, and we use an iterative and collaborative approach to ensure continuous learning and improvement. We place great emphasis on sustainability and incorporate this principle into all our processes and actions. We actively share our knowledge and encourage an open exchange of information.

The dimensions of sustainability in software development

The way we see it, there are two main dimensions that contribute to sustainability in our software projects.

1. The ecological component focuses on the efficient and responsible use of resources. We ensure responsible use of resources even at the IT design and architecture implementation stage – in creating the data model and choosing appropriate algorithms, for example. Our doubleSlash Coding Codex, for which our software developers are responsible, provides guidelines regarding the use of resources in software development. An example from the codex is: "Use efficient technologies". For example, we only use newer versions of Java because they have a smaller memory footprint than older versions due to a more efficient string storage method. This not only saves memory, but also reduces costs.

2. The second dimension is about longevity and quality. In other words, high-quality software solutions with a long service life are more sustainable than constant new developments. Good software architecture and documentation, as well as a sound tests and security concept, help to make software maintainable and durable. Aspects such as scalability, expandability and user-centred design play an important role in this context.

Growing social relevance of software

"Green in IT" refers to the ecologically sustainable use of resources in software development. Additionally, "Green by IT" – support of sustainable projects using IT – offers the opportunity to change structures and processes in such a way that they contribute to the achievement of sustainability goals.

The social relevance of sustainable software is growing.



Stefanie Scharmann & Stephan Olsowski

Process designers for sustainable Software Development

> [More about the technical implementation of sustainable software](#)

Catena-X: A new dimension in the value chain of the automotive industry

Every car consists of tens of thousands of individual parts, making the supply chain complex. The globalised automotive value chain encompasses a multitude of processes, technologies and standards, creating challenges such as a lack of transparency and untapped opportunities. To address these challenges and enable greener production processes through digitalisation, Catena-X uses a data ecosystem based on transparency and information protection.

The mobility industry is in a state of flux: electric vehicles are gradually replacing internal combustion engines, while digitalisation is opening up opportunities for greener production and individual customer preferences. At the same time, factors such as pandemics, climate change and war are bringing additional challenges. To achieve a successful, sustainable transformation process, close cooperation and exchange among participating companies and experts is essential.

Let's take an example: the Supply Chain Duty of Care Act, which came into force in Germany in January 2023, requires companies to take additional measures. Companies with more than 3,000 employees are now obliged to ensure that their supply chains meet ethical, environmental and social standards. Manufacturers and retailers are required to know their upstream suppliers and select them sustainably – at every stage of value creation in their supply chain. Transparency is a basic prerequisite which many companies are not yet able to fulfil. Information about supply chains is often based on supplier self-reporting and lengthy Excel spreadsheets. This makes it difficult to collaborate effectively.

Digital collaboration creates opportunities along the value chain

The aim of the Catena-X consortium project is to create transparency and enable the digital flow of information along the entire supply chain. The aim is to network and enable collaboration between users, suppliers, SMEs, large companies, raw

material suppliers and recyclers. This provides an opportunity to learn from each other and gain new insights that can lead to innovative solutions for greater sustainability and new shared business models. The transparency and cross-company use and exploitation of data creates new value creation opportunities for all members:

- > **Reducing CO₂ emissions:** By working together, companies can analyse the carbon footprint of their supply chains and take action to reduce it. Digital technologies can be used to collect and analyse data along the entire value chain, all the way to the end customer. This data includes information on energy consumption, transport routes and other relevant factors that contribute to the carbon footprint. On this basis, weak points in the supply chain can be identified and improvement measures introduced to reduce emissions. Ultimately, these digital solutions enable the end customer to obtain a complete carbon footprint and make informed purchasing decisions.
- > **Traceability:** Traceability is critical to the complex value chain of a vehicle. End-to-end data chains show exactly which materials, components or software were used. Until now, companies only documented their own responsibilities and did not share the information with each other. Collaboration saves time, costs and improves quality management in the case of a product recall, for example.
- > **Circular economy:** Relevant information is recorded in a data ecosystem. A digital twin is created for each product and can

be used across industries within the value chain. Catena-X opens up data corridors for these companies to share and retrieve information. Only through the collaboration of all stakeholders can the full benefits of the circular economy be realised. This includes fully documented product and process information, improved resource utilisation, and timely mitigation of material fluctuations and bottlenecks.

Shared standards and collaboration built on trust

The guardrails for successful and trustworthy collaboration in the Catena-X consortium project are formed by jointly defined standards that guarantee all partners equal rights, interoperability and data sovereignty. Trust between partners is central to ensuring effective communication and collaboration. The Catena-X ecosystem is based on open-source approaches that are freely available to all participants, enabling participation by small and medium-sized enterprises. To ensure that the data infrastructure can always be adapted and extended to the needs of the user, continuous research and development of new technologies and standards is helpful in the consortium project.

Understanding and uniting two worlds

Successful implementation of Catena-X requires experienced experts with domain knowledge, and a willingness from companies to participate in the project. Interfaces need to be created to join the data ecosystem with enterprise systems and enable data exchange without sacrificing data sovereignty. Core services enable basic functionalities such as identity management or participant and service management. Data rooms provide central services for data providers and data users. On this basis, specific applications can be developed to solve concrete challenges and requirements.

Thanks to the open, multi-layered exchange between different companies, the best possible solution can be found for all parties.

Is this the end of centralisation?

Catena-X is setting new standards and foundations for decentralisation in a previously centralised business environment. Operating companies (including medium-sized businesses) plan to offer services and establish hubs in different countries. This will facilitate the onboarding of Catena-X so that medium-sized businesses without complex IT infrastructures can also benefit.

And this is just the beginning: using the platform will help identify errors in practice and develop improvements, which will then be rolled out. This not only creates benefits for medium-sized businesses by ensuring the traceability of deliveries – it also opens up the potential for new business ideas in a completely new ecosystem.

Catena-X is set to revolutionise not only the automotive industry. Other sectors such as medical technology, industry or logistics will also benefit from the project and the standards developed. So get ready for an exciting journey – we're happy to be on board.



Nico Götz

Consultant in the
Catena-X Sector

> [Learn more about Catena-X](#)

Source:
> <https://catena-x.net/de/>



FOCUS ON THE USER

Personalised services revolutionise the mobility of the future

Software-driven and personalised applications are increasingly determining the value of our cars. This is accompanied by a fundamental change: performance features and services will soon no longer be tied to the hardware but to the people who use them. This opens up a huge playground and learning arena for car manufacturers, suppliers and software developers. They need to learn how personalised features work in the market, which existing business models are reinventing themselves, and how this opens up new customer segments.

The parallels with the smartphone are obvious: vehicles are becoming the hardware base for software providers. The specific scope of functions and value creation is shifting more and more towards software-driven applications and services.

There are three main areas where software will determine what a car can do in the future:

- > Advanced Driver-Assistance Systems (ADAS), which are mainly serve safety and are paving the way for autonomous driving.
- > Infotainment applications or applications that turn the vehicle into a mobile office.
- > Apps that offer further added value such as the digital key, bookable services and functions, or other applications in the wider e-commerce segment.

For example, more powerful engines, heated seats, brake assist systems and digital services can be purchased and paid for on demand or by subscription – regardless of the initial vehicle configuration. And all of this directly in the "in-vehicle app store" as we know it from our smartphones.

Experts believe that there will be a boom in other software-based services once highly automated driving (level 3) and fully automated driving (level 4) are ready for the mass market. When control is transferred to the vehicle, it is not only advanced assistance systems that are needed.

The person driving can use various systems in the car which serve entertainment purposes, for example, or make life easier in other ways: automatic billing systems for tolls, parking fees or EV charging stations. Or personalised navigation services based on individual preferences – independently of the vehicle.

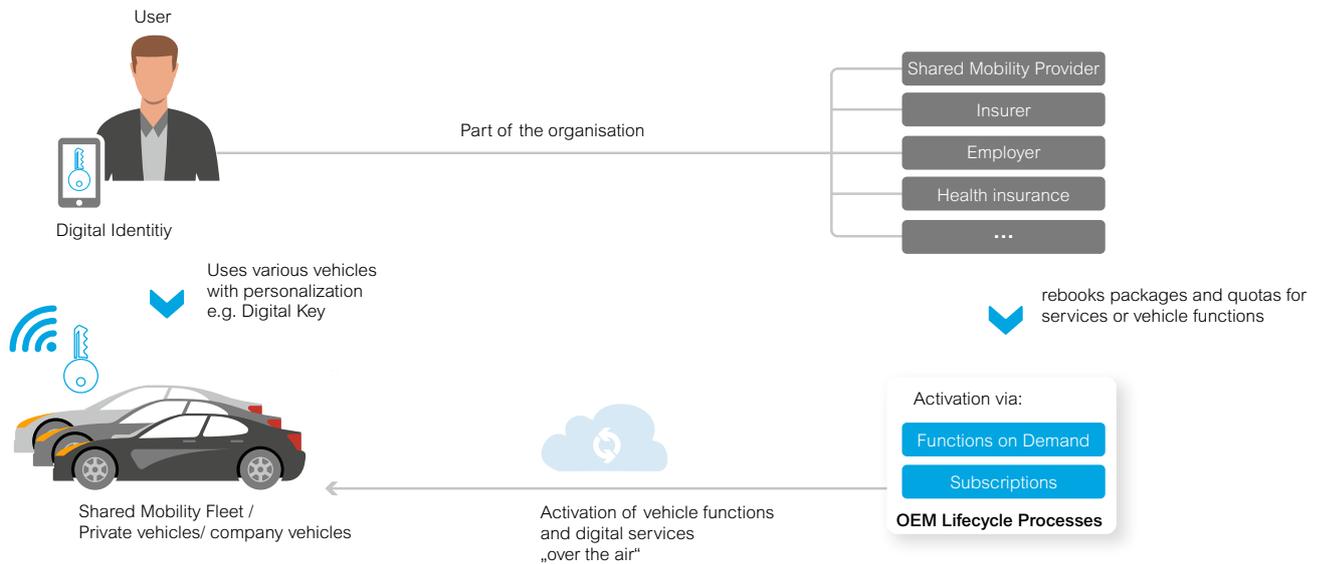
A central element in the vehicle of the future: personalised services

It is already clear that many digital services will no longer be linked to the vehicle in the future, but to the person using it. In concrete terms, this means that personalised services will be available to the user in all other vehicles from the same manufacturer. The advantage is that all the services and settings booked in a private vehicle can also be used in shared mobility or fleet vehicles.

But how can this flexibility be put into practice?

It requires a unique digital identity. One potential form is the digital vehicle key, which not only opens the door to your own vehicle, but also enables new personalised mobility concepts through secure and rapid creation and sharing of a key.

Behind what at first glance appears to be a "simple service" in the sense of a digital vehicle key, several different business models for the customer can emerge at the same time. For example, the digital vehicle key can be parameterised with a time limit.



Individual mobility redefined: How personalised services are revolutionising the future of mobility

This means that, in addition to the security aspect, the duration of a booked service can also be defined. The digital vehicle key is therefore a potential enabler for personalised business models – but it is only one example of many:

- > A car insurance provider establishes that an activated emergency braking assistant or parking assistant reduces the number of rear-end collisions and parking accidents. As a result, they have a vested interest in enabling their policyholders to use this feature free of charge. The reduced risk of accidents increases the safety of the insured party and saves the insurance company money. It's a classic win-win situation.
- > An employer has a booked contingent of temporary level 3 or level 4 packages (see above) in its fleet, which are available to employees for business trips. This improves productivity, safety and comfort.
- > Personalised services will also boost the used car market. When people buy used cars in the future, their digital identity will determine what their next vehicle can do, as this will be determined by the individually compiled service portfolio. All within the framework of the vehicle's hardware equipment.

The speed of learning and adaptation determines competitive position

Services or entire service segments, such as the personalisation of mobility services or the creation of digital identities, are the foundation of existing and future business models. OEMs need to learn quickly and accurately from today's usage cycles in order to remain competitive in the future. One way of doing this is through data-driven analysis of user behaviour in order to get a better idea of what customers are likely to want in the future – using product analytics, for example.

Companies that focus on digital services, actively drive personalisation and are flexible, adaptable and open to new business models will play a strong role in the automotive market of the future.

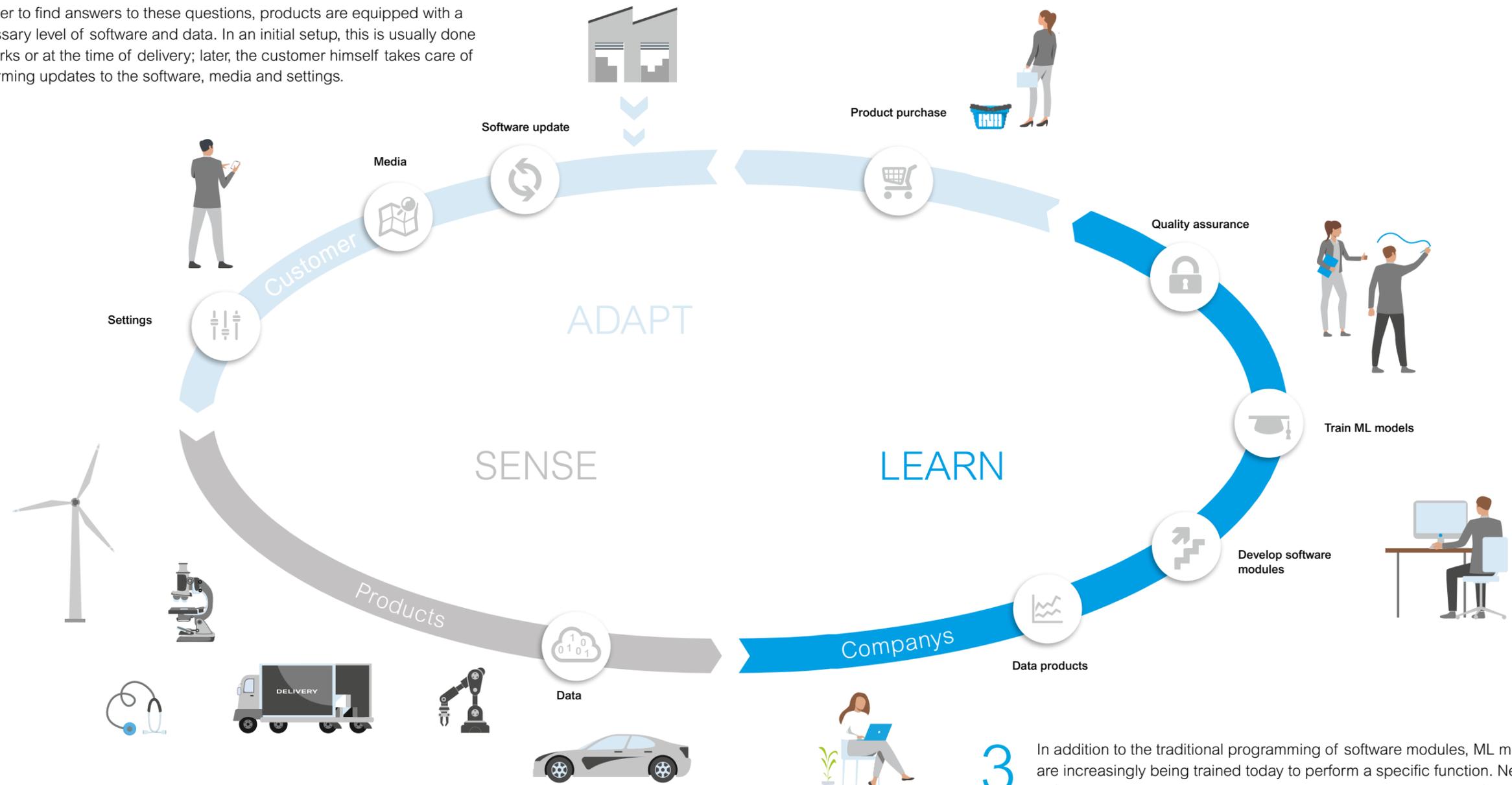
- > [Learn more about Connected Mobility](#)

How data improves products

Which function maximizes the benefit of a product? Product managers in companies ask themselves this question almost daily. After all, if the benefit for the user is maximized, then the value creation for the company also increases with corresponding pricing. To be able to solve these issues, it is essential to learn from as much of the product's data as possible during use, i.e. in operation.

1 In order to find answers to these questions, products are equipped with a necessary level of software and data. In an initial setup, this is usually done ex works or at the time of delivery; later, the customer himself takes care of performing updates to the software, media and settings.

4 Completely new functions end up in the Marketplace or App Store and can be purchased by the customer. If the customer performs an installation, the cycle of learning and improving begins anew. Companies that best master this learning cycle and can execute each iteration efficiently and quickly will dominate the market in the future.



2 Once the product is in operation, the usage, consumption, wear and tear or other transaction data is used to create data products that can be used to further develop functions for the product.

3 In addition to the traditional programming of software modules, ML models are increasingly being trained today to perform a specific function. New software or ML models are accepted by the product managers after extensive quality assurance – in the best-case scenario fully automated – and made available to the customer as updates.

From sales to dialogue: What we can learn from the subscription economy

In the traditional sales model, customer and provider typically interact only once – at the point of purchase. Providers often have little interest in the longevity of a product. In the subscription economy, on the other hand, providers and customers have a shared interest in the long-term, efficient use of products to build a lasting business relationship. The same applies to product enhancement. Customers and providers want a product that is optimally adapted to their needs and offers maximum benefits.

Successful subscription management turns connected devices and digital services into sustainable relationships

Subscriptions are more than just another way of billing. They represent a new business model that puts the customer first. “The industry is still in the initiation phase,” says Dr. Lennard Holst of FIR e.V. at RWTH Aachen University. “It’s about strategic rethinking away from conventional product sales towards providing continuous access to a service. It is also about continuously improving performance on the customer side. There are only a few companies that have already successfully implemented this in its entirety.” This is because it involves fundamental changes to business processes. An important aspect of becoming a 'customer-focused company' is the cultural change it entails. This makes it possible to learn together with the customer and to automate product development. In this way, a continuous improvement process is created, aimed at a long-term, sustainable customer relationship.

What matters: The key to success in the subscription business

Innovation as a continuous process

Large, comprehensive product releases and long-term contracts that customers cannot cancel early do not meet the needs of the subscription economy. Instead, close collaboration between research, development, and go-to-market teams is required to analyse customer needs and deliver new value-added features. A dynamic, close-knit internal organisation with a rapid

flow of information and fast "time-to-market" helps to create a competitive advantage.

Flexible offerings and sustainable pricing

Companies in the subscription economy need to deliver consistently high performance. This is because customers can cancel their subscriptions at any time. This includes continuous expansion of their offerings and ongoing analysis of customer needs in an effort to constantly improve products and services. In contrast to opportunistic pricing, the subscription economy relies on personalised pricing to avoid price wars and downward spirals and to maximise customer value. Pricing must focus on creating value for the customer, not just short-term margins. A scalable and expandable product catalogue and clear communication of customer value are critical.

Customer service through active customer success teams

Praise and positive reviews can be used to win customers, but criticism and requests for improvement should also be seen as an opportunity to grow and learn. Companies deploy dedicated customer success teams to actively monitor usage metrics, provide training, and offer preventative support in an effort to measurably maximise customer satisfaction and customer success. These teams continuously analyse customer feedback and data to identify trends and patterns, and then incorporate these into product development to ensure that new features or enhancements meet customer needs and deliver value.

Flexible, well-integrated subscription management systems

For smooth adaptation to new product or pricing models, it is important that processes, systems and the entire IT landscape are flexible and can be adapted by the end customer without any obstacles. Subscription management systems provide this flexibility.

The decisive factor here is integration across almost all areas of the company. This is the only way that new pricing models can be quickly tested with the customer, and that the insights gained through the use of data analytics can be incorporated into product development.

To avoid transferring problems from one area to another, it is advisable to decouple subscription management systems from traditional transactional systems. This is a best practice in software development that increases the stability and flexibility of the overall system.

The subscription economy as an opportunity for customer and sustainability-orientated companies

The subscription economy offers companies the opportunity to develop sustainable business models by establishing connected devices and digital services. The key to success is strong customer loyalty and continuous feedback and improvement. By using data analytics and personalisation, companies can better understand their customers' needs and requirements and continuously improve their products and services.

"Many companies in the manufacturing sector are finding that their products are basically 'oversized' for their customers' needs," explains Holst. "Over time, they realise that many features and product variants are completely unnecessary, and that, in the end, there are very few customers who use the full range of capabilities. Subscription is all about identifying core customer needs and addressing them with a specific combination of product, digital services and traditional services. We're noticing a significant reduction in variation and complexity in the service offerings of successful subscription providers. This will be a huge driver for the subscription economy from a sustainability perspective."



Meike Vogt
Subscription Management
Team Leader

> [Learn more about Subscription Management](#)



Dr.-Ing. Lennard Holst is Head of Service Management at FIR e.V. at RWTH Aachen University. The team supports industrial companies by means of maturity assessments, benchmarking and individual projects in the transformation from traditional product to service or subscription provider. Thanks to the long-standing partnership between FIR and doubleSlash, we are able to provide our customers with comprehensive consulting services ranging from business case consulting to system-side implementation.



USING DATA CORRECTLY

Learning more effectively with data products

Learning is the process of acquiring information and connecting it in a way that leads to new insights – insights that in turn lead to change and improvement. The more structured the process and the more tangible the benefits of the information, the more effective the learning. This is where data products come in.

There is no doubt that data holds immense potential for value creation. Large companies such as automotive manufacturers have been systematically exploiting this potential for several years. However, there are many companies that use their data riches rather haphazardly or at best rudimentarily. One of the main reasons for this is the lack of principles for organising data. But if you want to generate added value with your data, order is exactly what you need. And data products can help create that order.

Focus on value

If a data asset is treated like a conventional product – with accountabilities and embedded in organisational structures that focus on its value, target groups and enhancement – the data asset becomes a data product. A data product is a specific output based on the processing, analysis or interpretation of business data (data assets). A data product organisation that emerges in this way leads to a learning process on two levels: The company learns a lot about itself, and the data products are subject to a continuous improvement process that increases their value.

This is achieved by enriching the useful data, the data assets, with metadata that makes it easier to use. This can include information such as which area the data belongs to, how often it is updated and what type of confidentiality applies. Metadata helps users find data products more quickly and assess whether they are suitable for the task at hand. If you have a specific problem to solve in your organisation, you may find an approach here without having to 'reinvent the wheel'. Each data product is assigned a data product owner. Data product owners manage their products and ensure the high quality of the data.

They maintain close contact with the data suppliers – development teams, data engineers or data scientists – and with potential users to ensure the product meets their needs. They generate new product ideas and manage their products through each stage of the lifecycle.

Ensuring high quality

The role of the data production organisation is to develop functional, high quality data products, harness their value for the business and ensure stable operation over the long term. It structures the sheer abundance of data and systematises its collection and preparation.

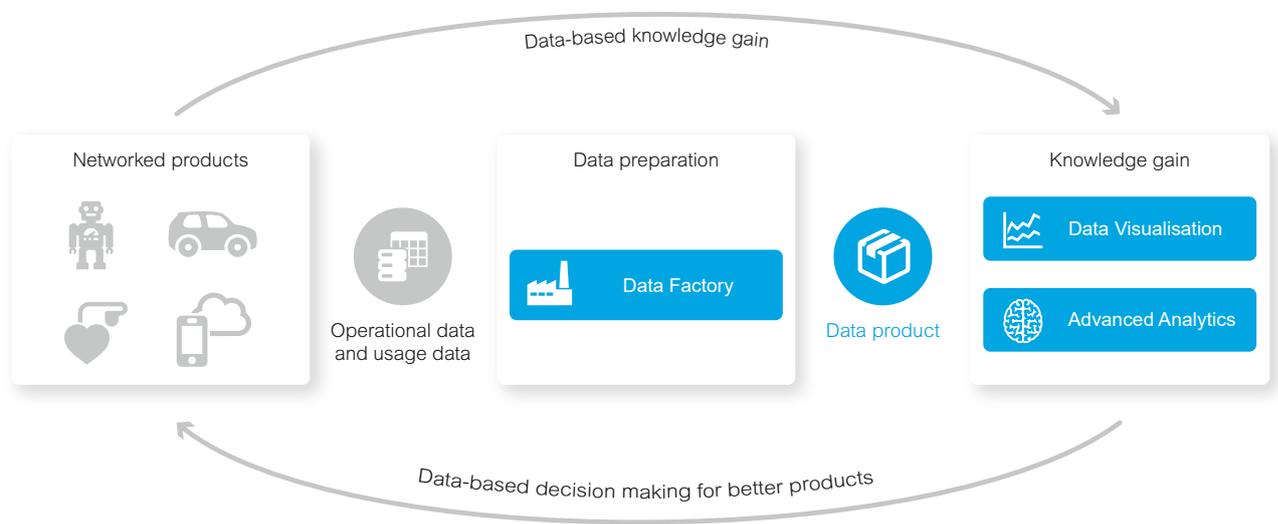
This has multiple benefits:

- > It prevents the proliferation of data that would otherwise escape targeted use in the long run.
- > It ensures the continued high quality of data products.
- > It improves the quality of decision making in the company thanks to the high quality of the data.

On this basis, the capabilities of machines and devices can be improved, as can the relationships between customers, products, services and companies. New, data-based value creation models can be developed in a targeted manner, and internal processes and their benefits can be optimised.

Data products can be divided into three usage scenarios:

- > **Data as a service:** The data is also the product that creates value in this scenario, such as weather, stock market or address data.



Improved products using data-driven decisions

- > **Data-enhanced products:** In this scenario, the data is used to enrich another product and enhance its value.
- > **Data as insight:** Data is used to better develop and market other products.

The data product approach is essentially decentralised. Nevertheless, it requires a central authority to prevent overlaps and inconsistencies and ensure a uniform definition of taxonomy and terminology. At the same time, a central authority can and should link data products from different domains and ensure uniform standards for data products as well as consistent quality across the board.

A central data catalogue makes it easier to find and use data products. It contains both source data and ready-to-use (intermediate) data products. It may also make sense to have a data marketplace where ready-to-use data products are available to specialist departments.

Prerequisite: Cultural change

Important: Companies need to look at their data products not only from a technical perspective, but also create new roles within the company to drive forward the handling of data products.

In order for a data product organisation to generate optimal benefits, the approaches described must go hand-in-hand with a profound change in corporate culture. A culture in which knowledge is used to secure position is counterproductive. To be successful in the digital age, high priority must be given to swarm intelligence and knowledge sharing.

Systematic learning processes create transparency

Once implemented, a data production organisation supports companies in getting to know themselves better. They learn more about their processes, employees, customers and products by analysing the data assets provisioned in data products to gain new insights.

Another learning process takes place at the data product level. Systematically organising accountabilities and processes around a data asset almost automatically leads to a continuous improvement process: The data production organisation iteratively improves the value of the data asset.

What experience shows in any case is that data product owners who develop good, value-added data products quickly become popular contacts. The more often useful applications are created from previously free-floating data, the stronger the desire in departments and divisions to use these opportunities for their own purposes.

- > [More information about data products](#)

Learning from data through usage analytics

In the medical technology industry, the smooth use of medical technology devices in everyday clinical and medical practice is crucial. Manufacturers often receive little feedback on the use, usage behaviour and potential problems of their devices. By analysing usage data, problems related to the use of a device can be identified, rectified and learned from.

One way of understanding usage is through usage analysis. This involves collecting and analysing data on usage in order to identify patterns and trends. The results can show where users are experiencing difficulties and where there is potential for improvement. In this way, device functions and learning material can be adapted to facilitate use and create a more positive user experience. Usage analytics can help manufacturers learn faster and optimise devices based on their usage.

Here's how usage analytics work:

The following provides guidance on how to conduct a usage analysis for a device (such as an endoscope):

1. Setting the goal of the usage analysis: Which questions need to be answered by the analysis? Identifying potential for improvement in the operation of the endoscope, for instance.
2. Collection of usage data by automated logging of device data (such as flow charts), observation or questioning of users.
3. Evaluation of the collected data by means of statistics and usage charts in order to identify patterns and trends, such as the frequency of device failures.
4. Formulation of a recommendation for action suggesting specific improvements.
5. Deciding on improvements to be implemented.
6. Implementation of the improvements.
7. Monitoring the optimisation and correcting any problems that arise.
8. Documenting the results to enable continuous improvements.

Success factors for smooth implementation of usage analysis

Against the background of high quality requirements for medical technology devices (in terms of safety and performance), the following points are particularly important:

- > **Legal compliance** with regard to data protection, MDR and safety.
- > **Insufficiently robust findings based on real data:** The results of the analysis need to be validated by device experts to ensure that identified usage patterns do not lead to false conclusions and that the correct findings are derived.
- > **Privacy concerns and user acceptance:** It is important that users are fully transparent about the data collected and how it is used. And that they understand the purpose of the usage analysis – to maximise user experience for a device.
- > **Technical issues:** Technical challenges should be considered when conducting a usage analysis. The device performance needs to be sufficient to record behaviour, for example. In addition, data loss should be prevented and data transmitted in a secure manner. The data itself must be recorded accurately and consistently.
- > **Lack of data accuracy:** The data collected might not be representative of the true device usage or might be affected by bias (data distortion), impacting its accuracy.
- > **Resource constraints:** Conducting a usage analysis requires additional resources. Time and/or an extended technical infrastructure must be carefully planned.

An optimal user experience through usage analysis – all benefits at a glance

Usage analysis for medical devices offers many benefits and improvements for manufacturers and users alike, and an optimal user experience makes devices highly desirable. Usage analysis provides the opportunity to identify and implement improvements:

- > **Product longevity:** By analysing usage and identifying enhancements and improvements, the product becomes usable for longer and continues to evolve. Product enhancements can be accessed by customers and billed using a subscription model.
- > **Optimisation of the user experience:** Analysing device usage can provide information about where users encounter difficulties in using the device (performance problems or device failures, for example) so that these can then be eliminated. This leads to a continuous improvement in user experience.
- > **Identification of usage patterns:** Analysing device usage provides information about how the device is used, which features are used most frequently, and which are seldom used. This information can help to better align the device and its features to the needs of the user and reduce the complexity of the device, if necessary.
- > **Cost savings:** By analysing device usage, inefficient usage patterns can be identified and optimised to save costs.
- > **Improving security:** Analysing device usage can help identify and address security threats in a timely manner.

Future prospects: What will the topic look like in the future?

In today's connected world, it is clear that usage analytics will no longer be limited to the mass market (smartphones and consumer electronics) but will increasingly be used in industrial and other segments such as medical technology.

Advanced usage analytics will make customer behaviour in this segment more comprehensible and transparent, which in turn will contribute to the optimisation of device functions. The methods and functions applied in usage analysis will continue to be improved and modularised to enable widespread use for a wide variety of devices and tasks.

In short, the increasingly large amounts of data available are helping towards a more precise understanding of user needs and an improved experience for users of medical devices.



Stefan Dürnay & Anita Fritsch
Project Managers for Medical
Technology & Data-Driven
Services

- > [Learn more about Medical Technology](#)



Danny Claus
KI & Advanced Analytics Expert

CONTINUOUS MACHINE LEARNING: ADDING VALUE AND IMPROVING EFFICIENCY

AI-based fault detection and maintenance planning in action

The financial damage caused by an unplanned shutdown of an industrial production plant is usually severe. But downtime can be reduced by up to 50 per cent and maintenance costs by up to 40 per cent – all with a little help from artificial intelligence.

Plant and machinery breakdowns are a major problem for manufacturing companies. Although they do not occur frequently, they are often not detected until it is too late and the plant is no longer able to operate properly.

The consequences are often serious:

- > Breakdowns affect the entire production process – often many more components are affected than just the faulty machine.
- > Lengthy and inefficient maintenance processes and high extra costs.
- > Dissatisfied customers and potential damage to the company's reputation.

Artificial intelligence can be applied to significantly reduce these problems. With self-learning machines that can learn and recognise if and when they require maintenance. Not only does this mean that maintenance can be planned in advance for greater efficiency. Downtime can also be significantly reduced.

Simple principle

All plant and machinery generates physically measurable variables while it is running: vibration, pressure, density, heat, and so on. These phenomena can be recorded by sensors and compared with other measured data. If significant changes occur, it is usually an indication that bearings, gears, pumps or motors are no longer running smoothly in the true sense of the word and need to be maintained or repaired.

On this basis, intelligent fault detection can be realised using AI methods. Although the economic potential is huge, many companies still find it difficult and there are a few obstacles to be overcome:

- > The plant needs to be equipped with sensors that collect the relevant data.
- > This data needs to be transmitted to an IoT platform.
- > The IoT platform must be capable of handling large amounts of data.
- > Suitable data must be available and appropriate algorithms implemented to reliably predict faults.
- > If necessary, third-party systems such as ERP or MES (Manufacturing Execution Systems) must be integrated to link the data.

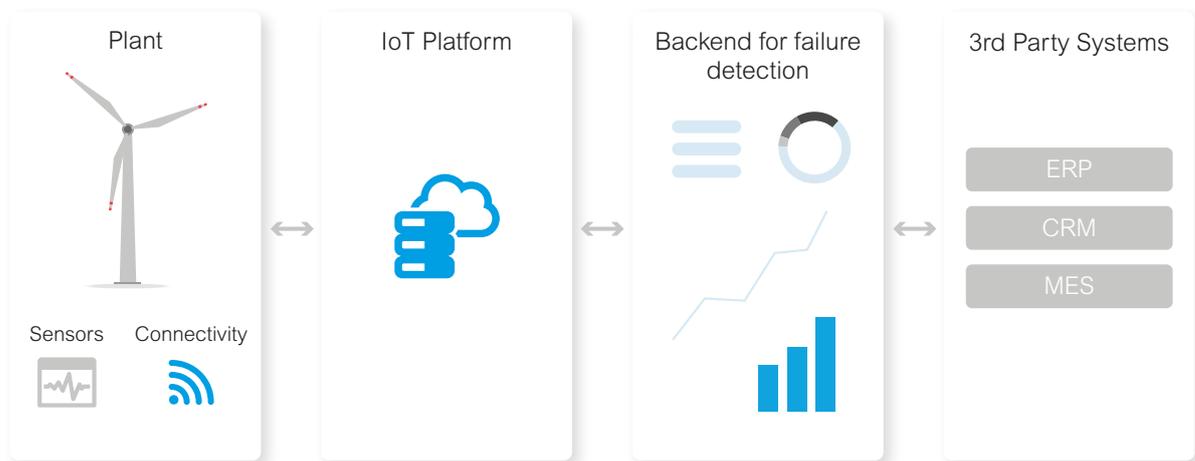
The more data there is available, the better the algorithms can be trained and the more accurate the results they deliver.

The realisation of such projects requires a significant investment of time and money, since they need to be strategically planned and implemented. Specialist experts such as data scientists bring the necessary know-how to implement projects successfully.

Reduce effort with software

Effort can be reduced by using prefabricated and reusable software components that can be quickly deployed and customised. doubleSlash has developed a software solution for intelligent fault detection and maintenance planning for industrial and infrastructure plants, known as ISII.

The idea behind ISII: Experience, best practices and recurring requirements are poured into standardised software components that can be easily adapted to the respective requirements. Recurring requirements include the versioning



Example approach to intelligent fault detection with AI

of data and models, the deployment and monitoring of models, and the selection and use of suitable algorithms. ISII provides all the functions required for use in customer projects.

Example of use in mechanical engineering

This example shows how ISII can be used to quickly set up a model for predictive maintenance: An international mechanical engineering company has various locations around the world, each with different machines. These machines transmit vibration data from engines and bearings to a cloud-based backend. At the same time, the company is planning to regularly launch new engines and bearing types on the market. With ISII, a wizard can be used to quickly create an executable solution for each location and engine or bearing type that can detect potential damage at an early stage and with a high degree of accuracy. The models generated can be customised for individual cases.

The algorithms, data and models used can each be versioned, deployed and monitored. Older models, algorithms and datasets can be accessed any time in order to compare or adapt them.

This allows maintenance managers to keep the cost of introducing and operating a predictive maintenance system within manageable limits. And they can quickly put intelligent fault detection into productive use.

> [Read more about intelligent fault detection](#)

Source:

> <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/the-internet-of-things-the-value-of-digitizing-the-physical-world>

Intelligent fault detection – the benefits at a glance:

- > Early detection of potential faults
- > Intelligent, predictive maintenance even before the system stops operating properly
- > Prevention of unplanned downtime
- > Minimisation of downtime costs
- > Faster productive deployment
- > Access to multiple proven methods and best practices for fault detection
- > Quick customisation to meet specific customer needs
- > Versioning of models



**Kerstin Glöckler &
Rebecca Hilebrand**
Product Development for
intelligent file sharing

DID YOU KNOW?

It does work: Connect the disconnected

Connected machines are revolutionising the way we use data and improve processes. At the forefront of this revolution is the ability to optimise even old machines through intelligent technologies. By analysing data, patterns and trends can be identified and used to improve the efficiency and performance of maintenance and production processes.

However, the environment is not always designed to support a smooth exchange of information. Continuous connectivity is not always possible for technical or safety reasons, for example. Plant and machinery may be too old to be equipped with the latest IoT technologies. Or they might be in a location without internet access.

The solution: connect the disconnected

Even unconnected machines can learn. Business Filemanager (BFM) Connect provides an alternative to large IoT platforms by making it possible to connect machines that were previously not connected. This facilitates the exchange of data and knowledge between machines and improves the collaboration between them.

How exactly does it work?

Machine data can be transmitted via the BFM Connect app and transferred to the BFM Connect cloud, where it is available for evaluation. How the data is transferred needs to be considered on an individual basis – depending on the application and interface – using Wi-Fi Direct, Bluetooth or NFC, for example

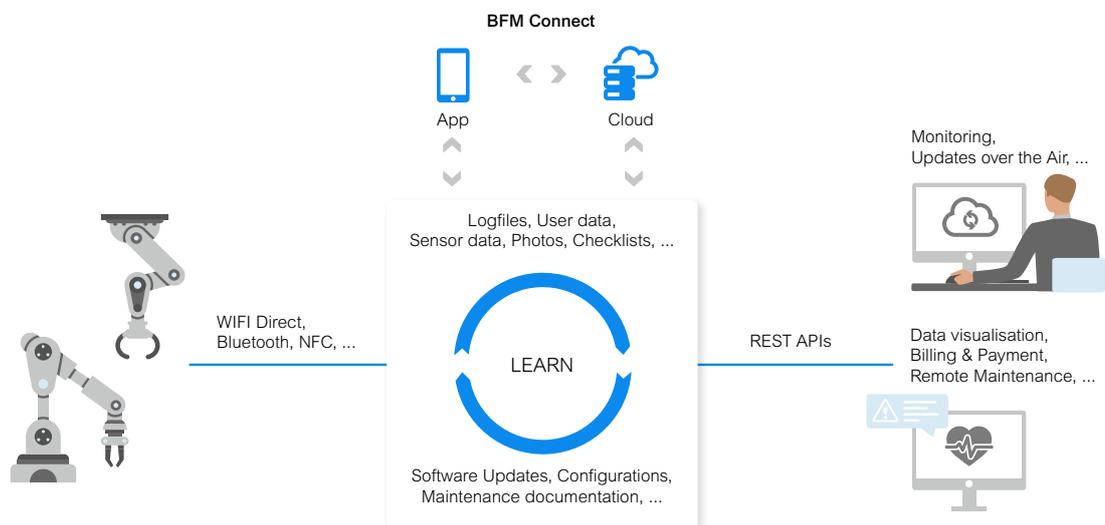
The transmission technologies used mean that the machines are not connected directly to the network but in a secure environment. Synchronisation of the data using the BFM Connect app and the BFM Connect cloud takes place when actively triggered from a secure network. This ensures that the data can only be accessed by authorised users. This way, updates can also be easily scheduled and applied to systems. Because automatic updates do not always make sense, for example, in the case of medical devices.

BFM Connect allows access to the smart services world

Even if machines cannot be connected, software can improve the flow of information and build a bridge to lifelong learning. This leads to improved services that customers enjoy using.

> [Learn more about BFM Connect](#)

Integrate non-networked machines into the smart service world with BFM Connect



Professional development in a learning organisation

The people, knowledge and best practices of any software company are fundamental to its success. That's why we've been investing in professional development and research right from the start – we most recently invested more than seven per cent of our annual revenue. In the following interview, HR manager Leonie Hlawatsch and team leader Michael Goldschmidt give an insight into LEARN, the professional development model at doubleSlash.

Why is professional development such an important topic at doubleSlash?

Leonie: Professional development is not just a case of accompanying and supporting talents but also providing the right framework for individual development.

Michael: Developing and sharing knowledge is an integral part of our company DNA. Everyone wants to learn and grow in connection with others, even in the workplace. doubleSlash offers a host of opportunities such as our annual TechDays, workshops held internally by colleagues for colleagues, or participation in external training courses and conferences.

How is professional development organised at doubleSlash?

Michael: There used to be time allotted for "self-study" and every employee was allowed to participate in internal workshops during working hours or give presentations themselves. On top of that, individual training courses were offered in consultation with the employee's line manager. All decisions regarding courses and budget were made by the management team.

Leonie: Today, the process is more open, transparent and individual. Employees can organise their professional development entirely based on their own needs or the needs of the team. Whether it's through self-study, attending training courses or conferences is irrelevant.

Another important change is that each team is responsible for its own training budget.

Participation instead of top-down decision-making was important to us. This allows teams to decide, based on their team vision, which training courses are best suited to them and which members of the team should take part.

Individual training on more sensitive topics can still be discussed and arranged personally and confidentially with the employee's line manager. In this case, the budget will be provided by HR.

How did the LEARN model come about and what's special about it?

Leonie: Our training activities have always been very varied but not always fully transparent across the doubleSlash team. In the past, employees weren't able to see who was actively working on which training courses at a given point in time, for example, or who was planning courses for the future. This meant that we were unable to fully exploit our synergy potential or encourage our employees to share ideas and experiences around the topic of professional development.

The new model offers more freedom and thrives on communication with each other, shared goals and exchange within the team and beyond. It makes dialogue into an integral part of the process and promotes aspects of our culture that are particularly important to us: accountability and participation.

Michael, you and your team tested the doubleSlash LEARN model for a year. Can you tell us about that?

Michael: We defined the initial framework parameters and continuously refined them in cooperation with HR. More transparency and flexibility for the teams, with as many advantages of the current model as possible and no disadvantages for any colleagues – these were the target criteria. It quickly became clear that trust and a certain amount of courage on all sides would play a decisive role.

Transparency and flexibility bring freedom and opportunities, but also responsibilities and obligations.

Nowadays, the entire team is involved in making decisions regarding training courses and active knowledge transfer is expected from participants.

During the trial year, this form of dialogue among participants was particularly important. Not only did we test a new model – our confidence in the model also grew considerably.

The feedback from the team, both at the beginning and also during the trial phase, was decisive for the implementation of LEARN and its acceptance, both among employees and by the management team.

How does LEARN work in practice?

Leonie: We use Jira and Confluence, both of which are agile management tools. A ticket is recorded for each training course, specifying costs and benefits, and then jointly evaluated within the team. Each team decides on the implementation and results of the respective course. The team lead and HR provide the budget framework for professional development on an annual basis and also provide organisational support as needed, both in terms of preparing and holding courses. Our platform for exchanging information on planned and past training courses is expanding with every course.

And how has LEARN been received?

Leonie: One year's trial turned into two, and the company-wide rollout of LEARN took place 18 months ago. We see the positive effects every day and are noticing how the LEARN model encourages learning: Taking on responsibility within the team, cultivating and promoting a culture of open exchange, reflecting on, planning and also implementing your own professional development. Today, 210 training sessions and 464 LEARN tickets later, we're continuously enhancing the model based on feedback from colleagues. So far, no one has suggested going back to the old model.



Leonie Hlawatsch & Michael Goldschmidt

One Team: Human Resources & Software Development

> [Learn more about our vision & values](#)

LEGAL NOTICE

doubleSlash
Net-Business GmbH

Otto-Lilienthal-Str. 16
88046 Friedrichshafen

info@doubleSlash.de
doubleSlash.de

Editorial
Hanna Pfaff
Lena Sieber

Design & Layout
Rosalie Mader
Anina Bauernfeind

Image sources
stock.adobe.com
istockphoto.com
doubleSlash

 **Discover what we do.**
> [Follow us on LinkedIn](#)