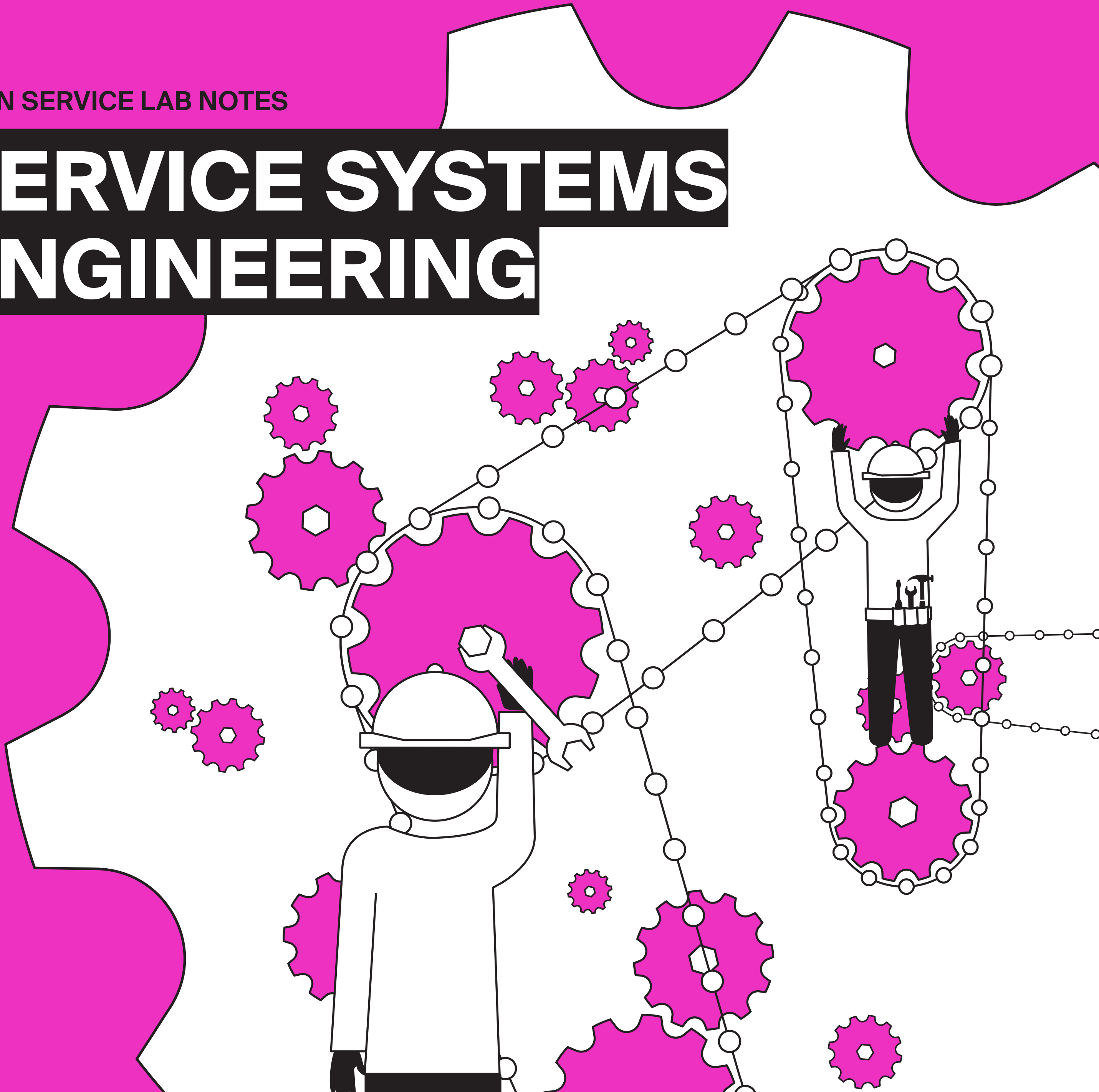
issue 6

spring 2020

OPEN SERVICE LAB NOTES

SERVICE SYSTEMS ENGINEERING



EDITORIAL

Dear Reader,

Welcome to this issue of Open Service Lab Notes on the exciting topic of Service Systems Engineering. In a world characterized by services and increasingly by service systems, it is essential to understand the systematic development and provision of services. This subject is the focus of Service Engineering. However, such services are usually no longer provided by a single actor but rather by an interaction of several actors and with the help of different digital technologies. Such complex service systems have to be developed systematically to provide services within these systems. The young field of Service Systems Engineering is dedicated to this topic and is presented in this issue. We will show what service systems are exactly and how they can be designed or constructed using a systematic method.

The notes introduce the new discipline of Service Systems Engineering. They presents a simple method for the engineering of service systems. The possible applications of this method will be presented at the end of this paper with three exemplary use cases.

Open Service Lab Notes are published as a series showcasing recent research and the latest discussions of the Open Service Lab (OSL) members. The virtual open laboratory OSL is hosted at the Friedrich-Alexander-University Erlangen-Nürnberg (FAU) in partnership with the Fraunhofer IIS in Nürnberg. The aim of this network is to bring together national and international experts from service science and future of work, pioneers in service innovation, as well as sponsors and research partners. As a platform for interaction between researchers and practitioners, the OSL seeks to establish a networking space for key players in the field of services, service innovation, and the future of work. The OSL Notes will keep you up to date with the lively exchange on current relevant topics in the field.

Feel free to join our conversations online at OSLNotes.com or to pose service innovation challenges that need to be solved!

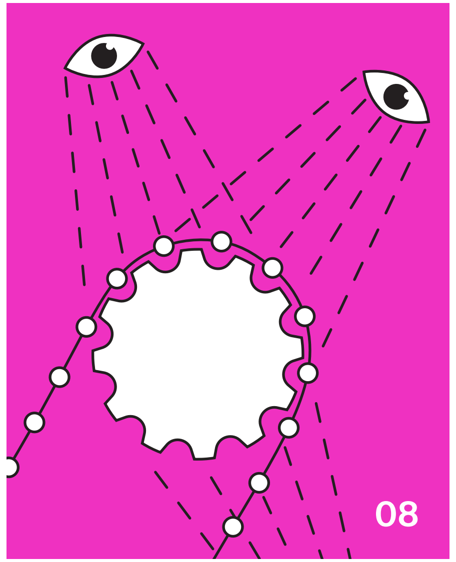
Angela Roth Kathrin M. Moeslein Albert Heuberger

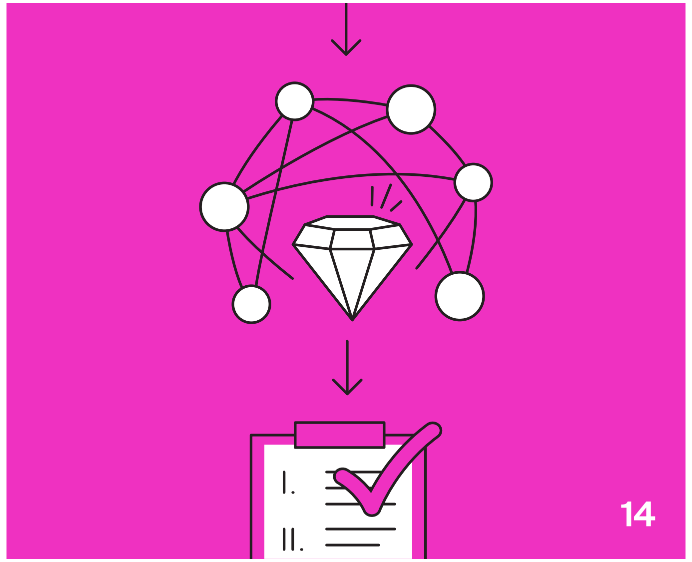
Prof. Dr.
Angela Roth

Prof. Dr.
Kathrin M. Moeslein

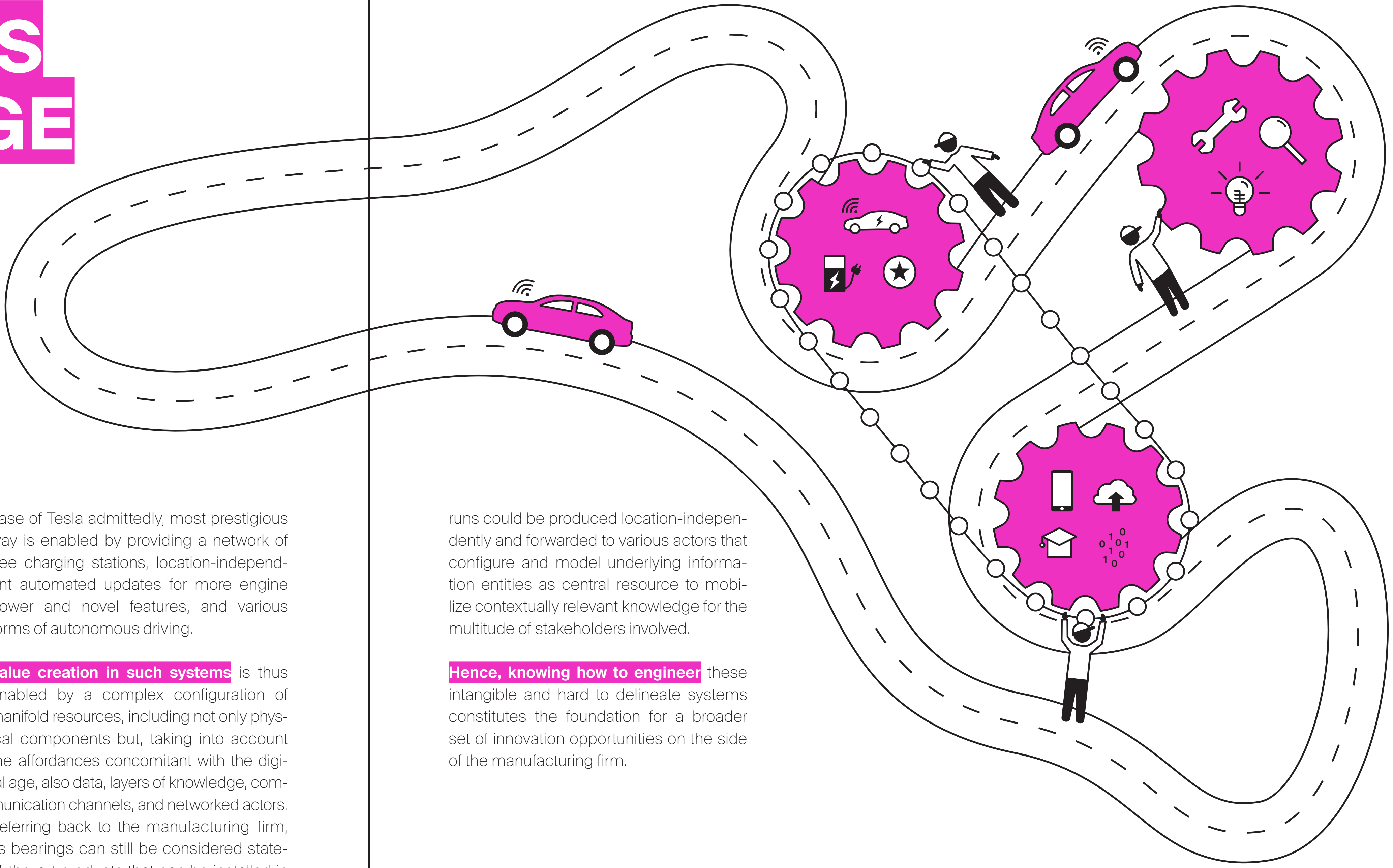
Prof. Dr.
Albert Heuberger

CONTENT





SERVICE SYSTEMS IN THE DIGITAL AGE



Consider a manufacturing firm that has produced bearings and machine components for ages. Its customers traditionally demand precision products with high-quality standards and long lifetimes. To date, the firm has used data generated in the course of internal test bench runs in order to further perfect its products and provide information concerning their capabilities to its customers.

However, in the digital age, with the rise of global communication networks, ubiquitous sensing of environmental as well as social conditions, and the integration of novel actors in widely ramified ecosystems, customers tend to shift their anticipation of value. In this context, increasing automation and high maturity in manufacturing processes allow for products with high performance and quality to be produced by a broad variety of firms, often from sectors formerly regarded as neglectable. This leads to value creation being perceived as a construct that mainly addresses the underlying value-creating mechanisms ingrained in the physical matter of tangible resources.

This, in turn, fosters deemphasizing the role of products as carriers of knowledge that is frozen into their physicality in the course of their development and production. In this vein, novel actors such as Tesla still install bearings within their cars in order to enable them to move from one destination to another, but, antithetically, foster the anticipation of the car as part of a value-creating constellation that is far more extensive. Thus, the value of moving in the most convenient and, in the case of Tesla admittedly, most prestigious way is enabled by providing a network of free charging stations, location-independent automated updates for more engine power and novel features, and various forms of autonomous driving.

Value creation in such systems is thus enabled by a complex configuration of manifold resources, including not only physical components but, taking into account the affordances concomitant with the digital age, also data, layers of knowledge, communication channels, and networked actors. Referring back to the manufacturing firm, its bearings can still be considered state-of-the-art products that can be installed in a Tesla but, beyond that, constitute a part of a bigger value creation constellation. The data formerly produced in test bench runs could be produced location-independently and forwarded to various actors that configure and model underlying information entities as central resource to mobilize contextually relevant knowledge for the multitude of stakeholders involved.

Hence, knowing how to engineer these intangible and hard to delineate systems constitutes the foundation for a broader set of innovation opportunities on the side of the manufacturing firm.

SERVICE SYSTEMS ENGINEERING

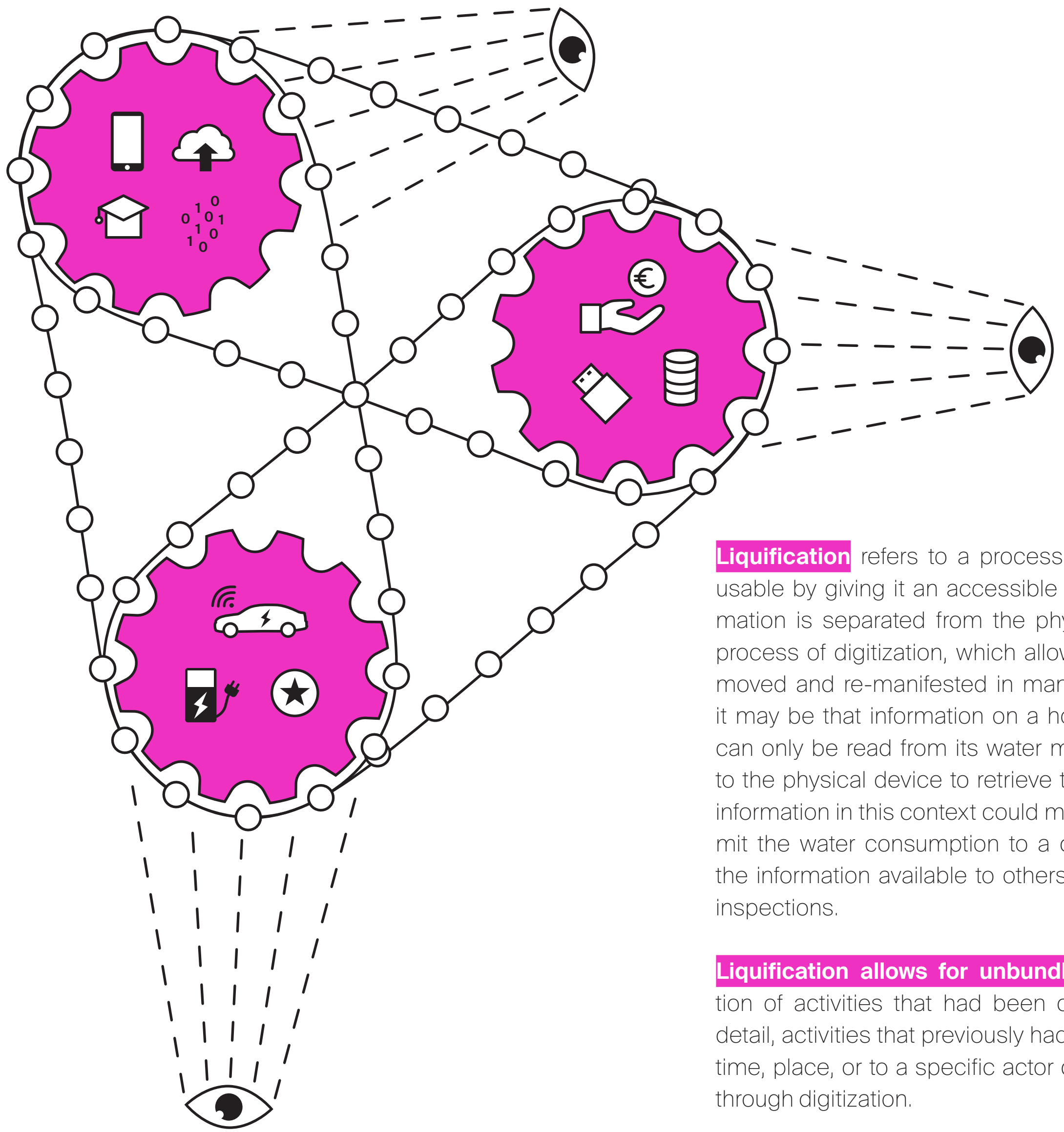
The paradigm of Service Systems Engineering (SSE) deals with design knowledge that encompasses guidelines on how to engineer real-world service systems that permeate our society. SSE takes the service system as the basic unit of analysis and aims to introduce novel methods and tools that are attuned to the special nature of these complex systems and thus support their systematic design and development.

Engineering novel and innovative service systems in the digital age is contingent on understanding the unique characteristics that distinguish these systems. Such design knowledge for so-called digitally enabled service is grounded in two central perspectives, which are addressed in the following.

A systems perspective is needed to address the larger constellations within which actors become joined by service over time and space. This perspective has more explanatory power than a singular, entity-level perspective, which may focus only on service customers or providers. This is of particular importance for digitally enabled service systems since these systems exhibit a specific capacity to produce unexpected change through unfiltered contributions from broad and varied audiences. This means that a priori undefined actors of varying capabilities, ranging from the curious individual to big organizations, may participate in digitally enabled service systems. In addition, their participation is unfiltered, i.e., they most often act autonomously, and their activities tend not to be centrally controlled. Against the backdrop of increased complexity in the service environment, a systems of service systems perspective is promising for providing the ground for the design and development of respective service systems from the viewpoint of a firm aiming to engineer digitally enabled service offerings.

An activity perspective is needed to understand how innovation in digitally enabled service systems takes place. In this context, the concept of resource density and the understanding of underlying mechanisms are essential. Density is a measure of the amount of information, knowledge, and other resources that an actor has at any given time and/or place to solve problems.

In this logic of value creation, the nature of digital technology constitutes a driving force to enhance resource density in digitally enabled service systems. Digital technologies help provide the infrastructure and artefacts that liberates these service systems from inherent constraints. In this context, constraints may refer to when things can be done (time), where things can be done (place), who can do what (actors), and with whom it can be done. In particular, the unique characteristics of digital technology enforce two intertwined dematerialization mechanisms that lead to the creation of new densities, namely liquefication and unbundleability.



Liquification refers to a process that makes information more usable by giving it an accessible form. In this process, the information is separated from the physical world, i.e., the technical process of digitization, which allows the information to be easily moved and re-manifested in many different ways. For example, it may be that information on a household's water consumption can only be read from its water meter. In this case, you are tied to the physical device to retrieve this information. Liquification of information in this context could mean that I use a sensor to transmit the water consumption to a cloud. In this way I may make the information available to others and separate it from physical inspections.

Liquification allows for unbundleability, which is the separation of activities that had been combined in a certain way. In detail, activities that previously had a fixed relationship in terms of time, place, or to a specific actor can be rearranged or changed through digitization.

Rebundleability is enabled by the two mechanisms: liquefication and unbundleability. Rebundleability allows the creation of improved densities between information, knowledge, and other resources. The improved densities resulting from the rebundling of different resources create new resources that are beneficial to some actors in a given context. This can then be seen as innovation in service systems.

Design knowledge for engineering digitally enabled service systems:

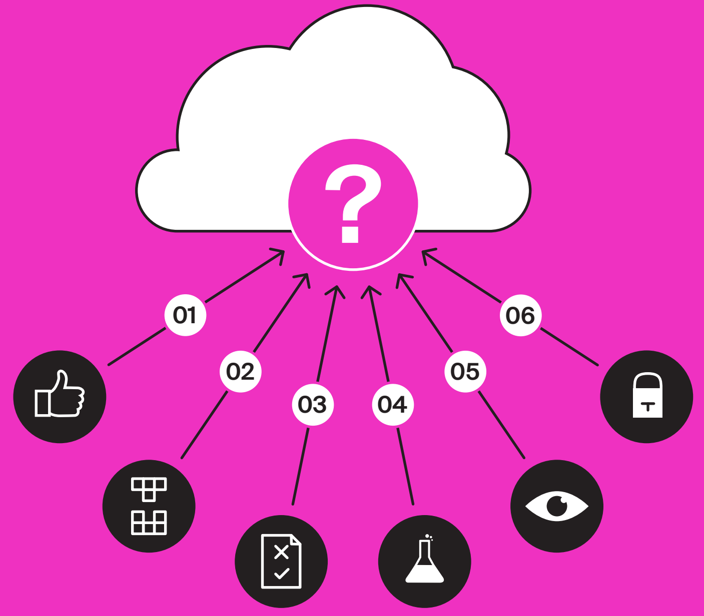
Descriptive or propositional knowledge encompasses the "what" knowledge about natural, artificial, and human phenomena, together with underlying laws, regularities, as well as relationships among them. Classifying, observing, measuring, and cataloguing allows for these descriptions to be made accessible to the human mind. In contrast, prescriptive or design knowledge embodies the knowledge of "how to do something". Such design knowledge is essential for the development of digitally enabled service systems. Corresponding guidelines deal with the reconfiguration of underlying resources and acknowledge both a systems and an activity perspective. As described in the following sections, three main reconfiguration principles can be asserted in the course of systematically designing a novel digitally enabled service system.

Principle I: Exaptation or actor-based service system reconfiguration posits that a novel actor conducts a certain value-creating activity based on its unique competencies. In this vein, exaptation encompasses different ways various actors can take part in activities they were formerly not applying their competencies to. This reconfiguration principle thus alters the dimension of actors, i.e., who performs an activity, in order to enhance the resource density in the service system to be engineered. This can take place in two general ways:
01. Actors with inferior competences in relation to a specific activity can be involved by making liquefied information available to them. By making the information accessible to these actors, they can be enabled to act as actors within this activity.
02. Actors with superior competencies in relation to a certain activity model can also use liquefied information to actively take over this activity.

Pinciple II: Improvement or adaption-based service systems reconfiguration fosters the creation of better solutions in the form of more efficient and effective deeds, processes, and activities in terms of time (when things can be done) and place (where things can be done). Hence, improvements are constituted by either a shift in time induced by novel insights and knowledge from information that is decoupled, liquefied, and modeled in different ways or a shift in location due to technology that allows for altering where deeds, processes, and performances take place. The scope of service system reconfiguration is thus modest. Small stepwise changes may lead to extensive changes over time. These changes can be conceptualized as follows:
01. Activity is conducted at another point in time due to novel insights and knowledge from modeling information.
02. Activity is conducted at another place due to the use of technology.

Principle III: Invention or activity-based service systems reconfiguration makes an actor use the information being liquefied in the course of digitization and combines this information with his existing or slightly further developed knowledge and skills. Hence, liquification of information triggers the integration of knowledge and skills, thus leading to novel deeds, processes, and performances. Invention can be differentiated among the dimensions of knowledge and skills integrated into deeds, processes, and performances as well as the beneficiary:
01. Integration of core competencies into new service offerings for existing or new customers.
02. Applying advanced knowledge and skills to existing or new actors.

INDUSTRIAL SERVICE CLOUDS



Cloud as a core resource of digital service systems

The ongoing digitization provides access to more data, which provide the foundation for the development and operation of new service systems. An efficient and effective use of this data is essential and requires appropriate resources of service systems.

Cloud solutions can be considered as a key resource, as they can provide a manifold contribution to both the development and the operation of digital service systems.

In order to make the variety of different cloud offers more accessible for companies from a service system perspective, the following six criteria may serve as a guideline.

01. Benefits: Evaluation of how concrete tools and methods are offered in order to enable companies to generate and acquire data, to store and analyse data according to their needs, and to apply the knowledge gained from the data to practical action.

02. Compatibility: Assessment of the extent to which the offered cloud solution can be embedded in the company's infrastructures, at what cost, and the required skills.

03. Complexity: Evaluation of the extent to which the implementation and use of the offer requires special resources or competences that need to be acquired or developed accordingly.

04. Testability within the organization: Evaluation of the possibilities to test the solution in a subarea of the company under real conditions.

05. Visibility of the benefit: Assessment how the benefit and the possible potential of the own company are visible.

06. Security and data protection: Evaluation of the extent to which the privacy, integrity, and availability of data are guaranteed and the control over the company's own data is maintained.

The presented criteria are intended to give companies a structure and need to be further detailed for a concrete evaluation based on the individual requirements of the respective company.

INTRODUCING A PHYSICAL-DIGITAL WORKBENCH

A structured development process is crucial for the successful realisation of a digital service system. The "physical-digital workbench" is a methodology to help companies develop and design collaborative smart services for the digital age. As an analogy to mechanical manufacturing, the term "physical-digital workbench" is thus used in this context, enabling a service system to be built by using the existing physical and digital tools as needed. The design of such services should be based on factual knowledge. The following phases should be implemented to ensure efficient and structured development.

01. The customer journey

Companies should consider that their offerings are only a point on the customer's journey. Individual companies usually contribute only a part to a final product or service. Usually, the combination of the expertise of many creates added value for the customer.

02. The customer jobs

Products and services are just a means to an end. In other words, the customer only uses them to achieve a certain goal or to satisfy a specific need. Often the customer has a completely different need than one would suspect. After all, the customer wants a certain job done and needs products or services to achieve this goal. With the help of digitalisation, we can address these needs more easily and offer suitable solutions.

03. The first draft

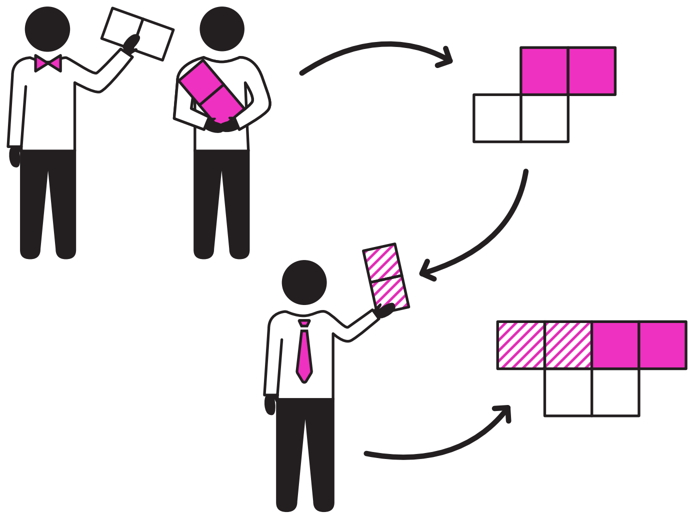
A simple visualisation of the considered service or service system can help to modulate different scenarios of the digitalised service more easily. It can also be considered as a description of the service system with its activities and resources to provide the service offering to the customer.

04. The digitally enabled service system

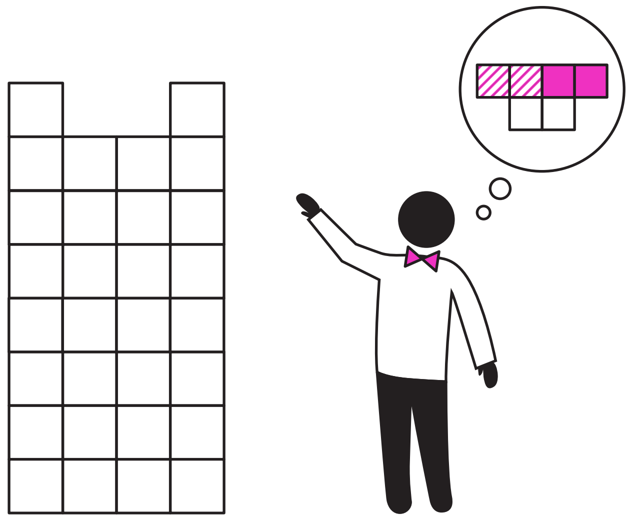
Due to the existence of various digital technologies and the involvement of different actors, different scenarios for the offer of a possible service can arise. These scenarios can now be analysed and compared in order to have a basis for decision-making for implementation planning.

In each of the phases outlined, there is a possibility of using appropriate physical (e.g. workshop) and/or digital (e.g. data analysis software) tools as required. By passing through the phases and the corresponding use of the tools, a digitalised service system is developed from scratch or an existing service system is optimised accordingly.

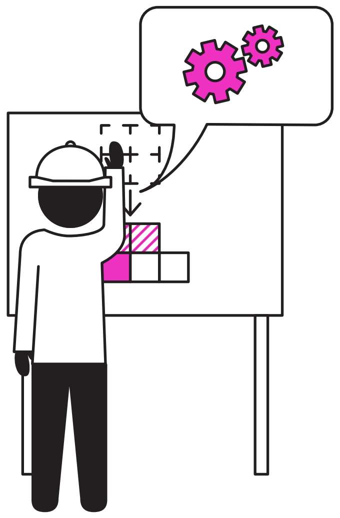
A manual for the physical-digital workbench can be found here. (In German)



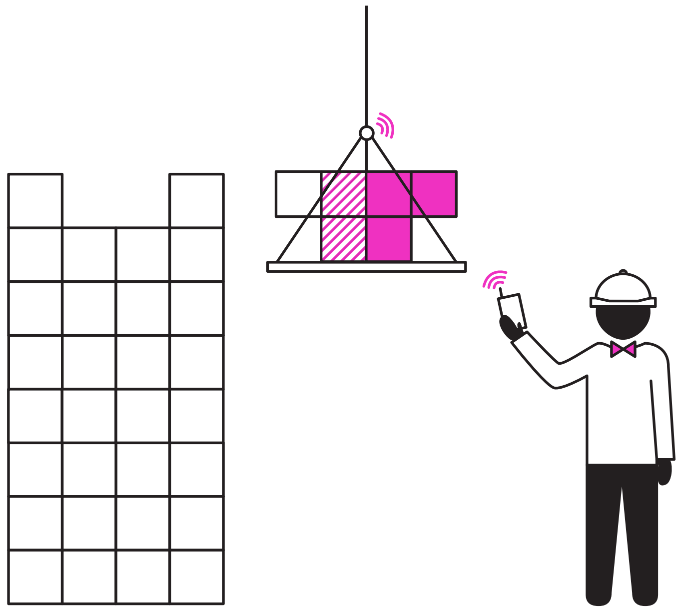
01. The customer journey
Creating understanding for the delivery of services through value creation networks



02. The customer jobs
Identification of innovation potentials



03. The first draft
Sketching an unbiased draft of a service



04. The digitally enabled service system
Creation of objectives as a starting point for further implementation

A METHOD FOR SERVICE SYSTEMS ENGINEERING

TRIGGER is a method that helps to design and develop novel service systems for the digital age. It combines four methods of service innovation, which, in their structured execution, enable the systematic development of digitally enabled service systems.

01. Customer Value Constellation (CVC)

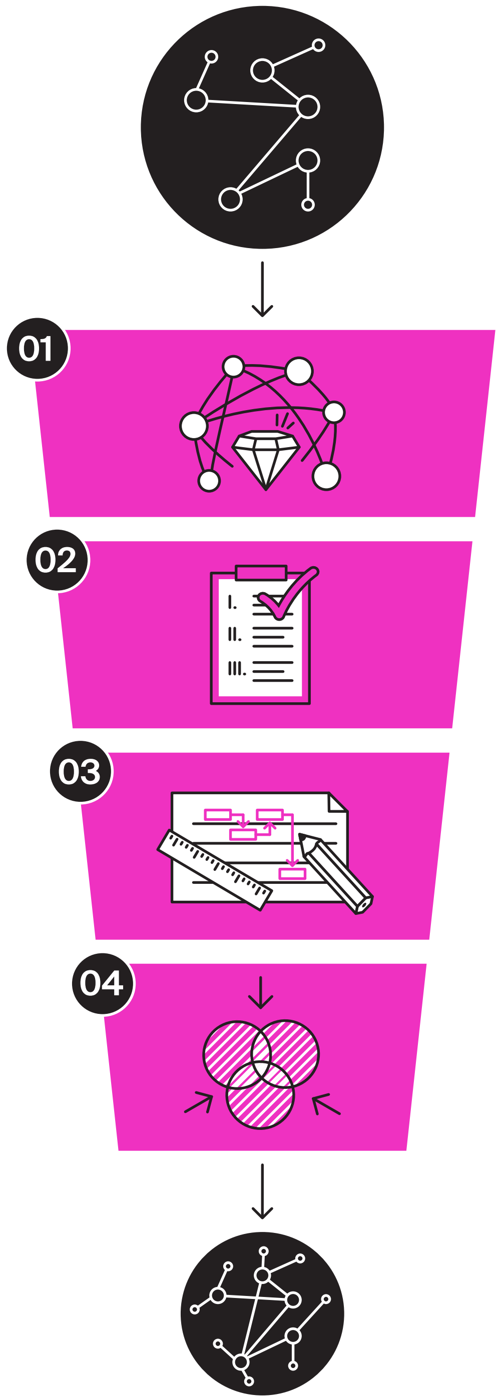
In the first stage, the current range of services is analysed beyond the boundaries of the company. To be more precise, it examines how the value for the customer is co-created within a network of organizations. In this way, the potentials for new service systems can be identified from the perspective of the company. Subsequently, alternatives for the repositioning of the service concept can be developed.

02. Create a Job Map

In the second stage, a list is created of the steps that are necessary from the customer's point of view to get a particular job done. The generated job map is used to identify new improvements concerning the previously defined positioning within the CVC. First, the job that the customer wants to have done should be defined; this represents the actual customer need. According to L. A. Bettencourt and A. W. Ulwick, such a job-to-be-done can always be divided into eight universal steps.

01. Define:	Determine their goals and plan resources
02. Locate:	Gather items and information needed
03. Prepare:	Set up the environment to
04. Confirm:	Check if the job can be executed
05. Execute:	Carry out the job
06. Monitor:	Assess whether the job is being successfully executed
07. Modify:	Make alterations to improve execution
08. Conclude:	Finish the job or prepare to repeat it

For each of these job steps, the specific activities to be performed should be defined.



03. Draft the Service Blueprint

In the third stage, the activities, actors, information flows, and technologies contained in the job map are then translated into a service blueprint to provide a structured view of this service system. This shows which actor carries out which activity in the service system and to which job step it belongs. It also shows what information and technologies are required by a particular actor to carry out this activity and what information is created in the process. The overview is necessary for the subsequent reconfiguration of the service system.

04. Liberation from Constraints by Digitization

The fourth stage serves to reconfigure the service system to achieve a digitally enabled service system with maximum resource density. For changes in the service system, it may be necessary to provide other actors with certain information. If the available information can be re-modeled and new knowledge can be gained from it, it may be possible to change the executing actor, the time, or the place of execution. These changes in the service system - for example, due to new actors - can lead to a situation where the company's service offering can expand or change to a higher level of value creation.

EXCURSUS:

REQUIREMENTS FOR DIGITAL SERVICE SYSTEMS ENGINEERING

DiDesigner is intended to be a digital tool for the application of the TRIGGER method and is intended to facilitate the application of the TRIGGER method in companies, especially in the innovation process. The DiDesigner can also be seen as an extension of the TRIGGER method, as it makes it possible to visualize different scenarios for the reconfiguration of the digitally enabled service system and thus shows possible effects to the user. For this purpose, a prototype was implemented as a client-side web application. The user interface was oriented on the components of the TRIGGER method but was optimized for user guidance.

Fine Tuning is the goal for which a digital tool like DiDesigner ties up with TRIGGER. It can provide guidance to the user to assess which actors could potentially have the specific knowledge to perform a particular task. For example, to shift the execution of an activity to another actor, you may need certain information. A digital tool such as DiDesigner, for example, can help to model the right technology and information flow to generate this information.

The advantages of a digital tool for Service System Engineering lie in the fact that users can be supported in going through the TRIGGER procedure in a structured way, thus fostering creativity. In addition, the user can more quickly perform and test possible reconfigurations of the service system. The possibility of visualizing these scenarios allows faster and better evaluation of design alternatives for the service system.

However, such a tool cannot be used as a basis for decision-making, so it can only provide part of the information necessary for the decision-making process. Instead, it serves as a representation and visualization of the possibilities of the service system to change or how it can be digitally enabled in different ways.

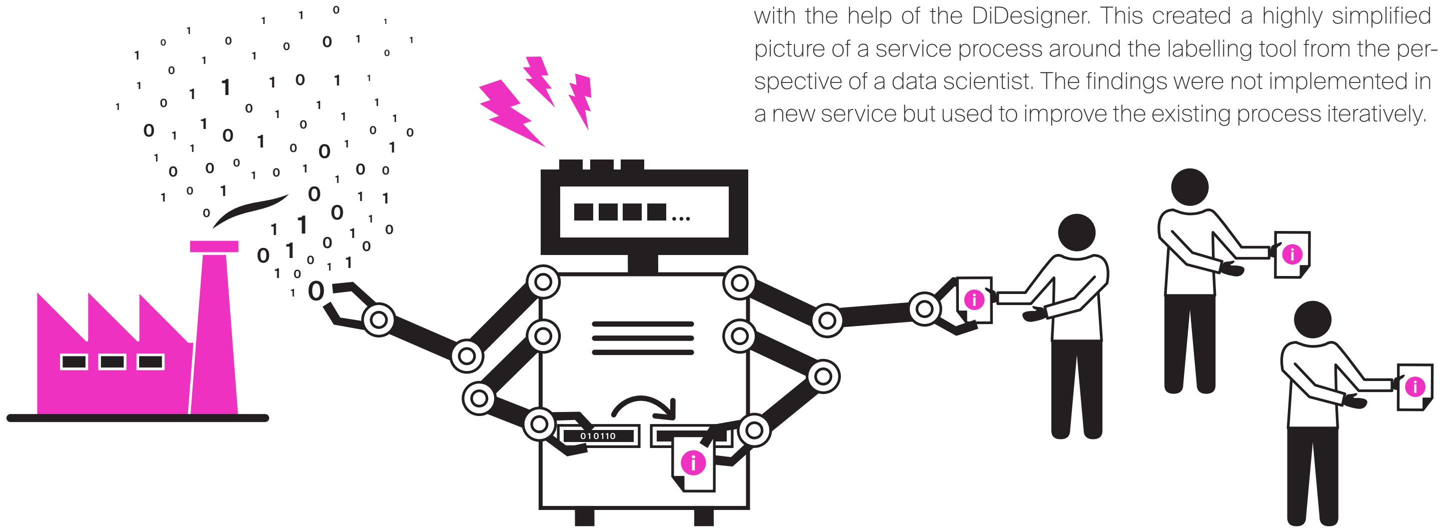
The adaptation of the tool to the company-specific context seems necessary to ensure effective use in the specific innovation process of a company. Such a tool should include functions for collaborating, sharing, saving, and repeating and undoing actions.

CASE: DATA-DRIVEN AI SERVICES

The use of artificial intelligence in monitoring industrial equipment for the purpose of predictive maintenance is a current trend. Such AI methods use data collected from sensors installed in the industrial equipment. In general, each AI method can be described by five phases: Data collection, data pre-processing, analysis, model training, performance evaluation of the model and improvement of this performance.

Case Description:

The challenge here is that most labelled data are missing to enable such prediction models. Therefore, a digital tool shall be developed to support the provision and the labelling of the collected data by data scientists and domain experts.



Approach:

01. Customer Journey: Development of a fictional persona "Karl" representing a data scientist. Analysis of the customer value constellation of Karl.

02. Customer Jobs: With the help of the Value Proposition Canvas, Karl's jobs to be done were identified and the associated pains and gains analysed. For this purpose, the workshop participants took Karl's view.

03. First Draft: The collected data could be used to identify gain creators and pain relievers and to create an exemplary service blueprint.

04. Digitally enabled service system: The last step was done with the help of the DiDesigner. This created a highly simplified picture of a service process around the labelling tool from the perspective of a data scientist. The findings were not implemented in a new service but used to improve the existing process iteratively.

CASE: SMART GREASE CARTRIDGE EXCHANGE

Global trends such as Big Data or Smart Data see data as a new resource that is systematically examined with algorithms to find patterns. For Instance, such patterns in data or correlations can be used for predictive or preventive maintenance.

Case Description:

The "Digital Grease Cartridge" is a Schaeffler AG use case which attempts to gain data from the use of existing physical products. One such physical product is a lubricator, which ensures the supply of lubricant to a machine via an inserted grease cartridge. The methods presented previously should be applied in the case to explore new business models based on smart data.

Approach:

01. Customer Journey: First, the existing ecosystem was analysed by creating a system map. A system map is similar to a stakeholder map, except that instead of looking at individual actors, companies are considered. This system map should help to understand how the individual companies contribute to value creation for the customer.

02. Customer Jobs: If one looks more universally at the actual job the customer wants to have done, it turns out that one wants his machines always to be lubricated so that they run smoothly. The aim is therefore not to replace a single grease cartridge. A possible service could therefore be that the lubrication of the machines is carried out independently for the customer.

03. First Draft: In order to carry out the lubrication independently for the customer, however, it is necessary to obtain data on the necessary time for changing the grease cartridge. For this purpose, data on the filling level of the grease cartridge could be analysed with the help of a sensor. A new actor could assist in collecting data, analysing data, and making information available to other actors to enable a digitised service. A cloud service provider was added to the service system as a new player when the service blueprint was created.

04. Digitally enabled service system: In the fourth step, a value proposition canvas was used to address the specific pains of the customer using digital service systems. Thus, by using digital technologies, certain tasks that the customer has to carry out can be performed in a different way, resulting in an advantage for the customer. For example, a precise analysis can show when the optimum time for changing the lubricant is reached.

An alternative business model scenario would then no longer be the sale of the lubricator including subsequent replacement cartridges, but rather the lubrication that would be offered to the customer as a service. For this purpose, a sensor attached to the machine could be used to monitor the fill level of the grease cartridge. The data from this sensor – or explicitly the fill level – would then be transferred to the cloud which would automatically take over the correct time to change the grease cartridge.

CASE: DIGITAL DOJO

The digital dojo is a project focusing less on the successful innovation of new business models and more on the use of digital technologies to improve business processes. In this use case, it was considered how employees could be trained on machines before they work in the real production line. The training phase of the employees can thus be shortened considerably without having to occupy the real machine for training purposes. Furthermore, it is not necessary for the employee to be physically in the same location as the machine.

Approach:

01. Customer Journey: The first step was to create a system map to record all the actors involved. In the middle of this system map is the plant employee to be trained, who can be considered a customer. The employee, as a user, must be the focus of attention.

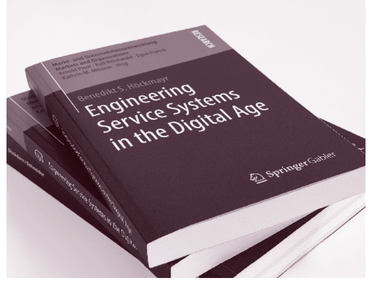
02. Customer Jobs: When analysing the actual job to be done, one will find that the goal is to train the employee as well as possible.

03. First Draft:. As this was a new service to be created, no existing process for creating a Service Blueprint could be used. Therefore, in this case, an exemplary customer journey was modelled in a workshop. This included the possible journey of the employee, from the early way to work, through his daily work preparation, to the training in a physical dojo room.

04. Digitally enabled service system: Various possible solutions were outlined and compared in a workshop. These scenarios resulted from the removal of possible restrictions, such as necessary knowledge, time, or place. For example, if an employee needs to be trained on a physical machine, there are restrictions on the time and place where the training can take place. This is because the employee is bound to the location of the existing machine. In addition, it is difficult to conduct training at all times, as production would otherwise have to be interrupted. The exact time must therefore be coordinated, which makes the training less flexible. By using digital technologies such as virtual reality, however, these restrictions can be removed.

The result was a virtual training room in which workplaces at production machines can be simulated with the help of virtual reality technology. The employees can practice the use case with the help of this technology without having to occupy a real machine for training purposes.

RECOMMENDED READINGS



Engineering Service Systems in the Digital Age

Benedikt Simon Hoeckmayr

This book provides a deep understanding of the underlying mechanisms for developing novel digitally-enabled service offerings. Thereby, it contributes evidence-based design knowledge that takes into account the characteristics of the digital age for the engineering of service systems.

Service Design Thinking

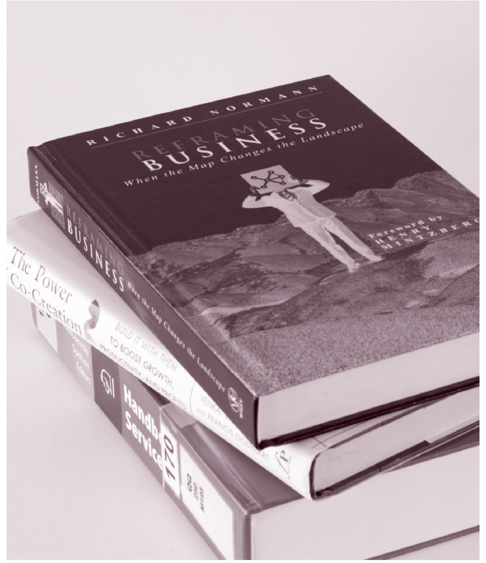
Marc Stickdorn & Jakob Schneider

Service design is one of the core topics in the agendas of companies in almost every industry. This book provides you with tools and examples to understand and master service design.

Service Innovation

Lance A. Bettencourt

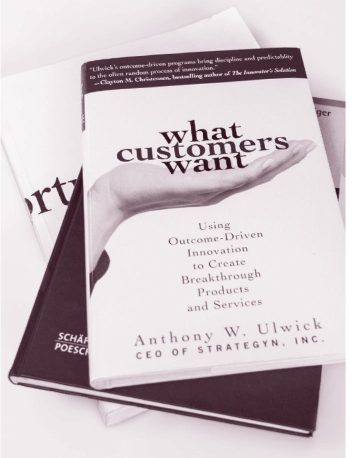
Bettencourts 'Service Innovation' is highly recommended for everyone interested in service innovation. The book offers ways to both improve current services and to develop new service concepts. The author provides a logical and sequential framework as well as meaningful real-world examples that illustrate how the service innovation process can be successfully applied across a number of service-related industries.



Reframing Business: When the Map Changes the Landscape

Richard Normann

Richard Norman shows new ways for companies to realign their business models. In particular, he discusses how to create new services for their customers by unbundling and re-bundling resources and activities. For example, new services and value propositions can be developed by changing the place where a task is provided, the time at which it is provided, or the actor performing the service.



What Customers Want: Using Outcome-Driven Innovation to Create Breakthrough Products and Services

Anthony W. Ulwick

In this book, Tony Ulwick introduces you to the "jobs-to-be-done" theory. This theory states that people have basic needs or processes in their lives that they address at a certain moment. In this context, products and services only serve to fulfil these needs. With the insights of this perspective and the framework and strategies presented in this book, companies can develop novel products and services to meet the needs of their customers in a structured manner.

A free revised edition is available online at https://jobs-to-be-done-book.com/

MANAGING DIRECTOR OF JOSEPHS GMBH

DR. BENEDIKT HOECKMAYR

What challenges are companies facing in the digital age?

Basically, due to the generative nature of digital technology and concomitant socio-technical processes, companies are facing the challenge that they have a broad range of opportunities when it comes to being innovative and approaching new value propositions. However, they mostly stick to incremental changes, focusing on their internal processes and company-oriented efficiency improvements. Eventually, companies neglect opportunities that could lead to establishing customer-centric value propositions that open up novel value creation opportunities. In the end, it's the complexity they face, and most companies do not have a suitable approach to managing this complexity and gathering knowledge for novel solutions.

Why is it important to think in Service Systems?

Service Systems are essential because they are an abstraction of value creation. So, in our times, you don't think about value propositions, which are focused on products, rather than on value propositions, which consist of a bundle of different resources. So, by thinking about services systems, you have a measure of how to design and build value propositions that do not focus on a single product. Instead, you have a perspective on different resources, for example, human competencies and information exchange between actors and technologies, which enable new value propositions. Thus, you have the proper mindset to understand value propositions that are not easy to handle.

How can systematic Service Systems Engineering (SSE) help companies to master these challenges?

By applying SSE as an approach to develop novel service systems, new value propositions can be created. Thus, new value can be generated for customers. By doing so, you jump into the innovation process in a very early stage. You get in touch with an idea of a service system and break that idea down into manageable elements. In SSE, therefore, complexity is broken down into modules and elements that the people inside companies can interact with and put together in different ways. Out of this, new types of solutions can be found, which in the end can meet customer needs. By addressing these different resources and the multi-layered architecture of novel solutions, you get a holistic view of what to deal with and what to develop throughout the process of establishing novel services systems.

What are the biggest challenges that can arise when applying TRIGGER?

From the mindset of TRIGGER, you always need people who interact with the methods that are applied throughout TRIGGER. One challenge can be that you have people that are too close in their mindsets. Instead, you need a variety of ideas to make it successful. For examples, if you only have engineers, you would focus on the things that are relevant from an engineering perspective. If you only have salespeople, you would focus on things that are relevant for salespeople. But, the core idea of TRIGGER is that you need people with different perspectives that interact with the methods from different perspectives, and by co-creating knowledge throughout the application of TRIGGER you ensure its successful. A second challenge could be that you are at a high level of understanding and get to the point where you have some good ideas about normal service systems, but they are not really close to implementation. On the other hand, when you are too narrow in the things you would like to develop, the degree of innovation is not that high. So, when you apply TRIGGER, you need a clear understanding of which perspective you would like to deal with.

Dr. Benedikt Hoeckmayr

Related Publications

[01] Boukhris, A., Höckmayr, B., Genennig, S., & Roth, A. (2019). Dienstleistungsentwicklung im digitalen Kontext – ein Plattformansatz. In Stich V., Schumann J., Beverungen D., Gudergan G., Jussen P. (Hrg.), Digitale Dienstleistungsinnovationen. (pp. 407-426). Berlin, Heidelberg: Springer Vieweg.

[02] Posselt, T., Hohmann, C., Boukhris, A., Genennig, S., Höckmayr, B., Danzinger, F.,… Möslein, K. (2018). Industrial Service Clouds: Entwicklung eines Kriterienkatalogs und Identifikation von Entwicklungsbedarfen. Fraunhofer Verlag: Nürnberg.

[03] Roth, A., Höckmayr, B., & Möslein, K. (2017). Digitalisierung als Treiber für Fakten-basiertes Service-Systems-Engineering. In Manfred Bruhn, Karsten Hardwich (Eds.), Dienstleistungen 4.0 - Konzepte-Methoden-Instrumente. Band 1. Forum Dienstleistungsmanagement. (pp. 185-203). Wiesbaden: Springer.

[04] Höckmayr, B. (2019). Engineering Service Systems in the Digital Age. Wiesbaden: Springer Gabler.

[05] Höckmayr, B. S., & Roth, A. (2017). Design of a method for service systems engineering in the digital age.

Imprint

Publisher
Sengewald et al. (2020), Service Systems Engineering in: Roth, A., Moeslein K.M., Heuberger, A., (Eds.): Open Service Lab Notes, 6/2020

Editors
Prof. Dr. Angela Roth
Prof. Dr. Kathrin M. Moeslein
Prof. Dr. Albert Heuberger

Authors
Timon Sengewald, Benedikt Hoeckmayr, Angela Roth, Christoph Hohmann, Frank Danzinger, Dominik Kalb

Contact
Chair of Information Systems
Innovation & Value Creation
Friedrich-Alexander-University
Erlangen-Nürnberg
Lange Gasse 20
90403 Nuremberg
Germany
+49 (0) 911 5302 284
www.wi1.rw.fau.de

Print
L/M/B Druck GmbH Mandelkow
Röntgenstraße 15
91074 Herzogenaurach

Design
PHOCUS BRAND CONTACT
GmbH & Co.KG
Nuremberg, Germany

BMBF Reference Number
FKZ 02K15Z000

The texts in this work are licensed under a Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0). It is attributed to the Chair of Information Systems I at FAU Erlangen-Nuremberg.

creative commons

FAU FRIEDRICH-ALEXANDER UNIVERSITÄT ERLANGEN-NÜRNBERG

wil

Fraunhofer IIS

Smart DiF

SCHAEFFLER

SIEMENS Ingenuity for life

Gefördert vom: Bundesministerium für Bildung und Forschung

Betreut vom: PTKA Projektträger Karlsruhe Karlsruher Institut für Technologie

OPEN SERVICE LAB