

HIGH-TECH MEETS HIGH-TOUCH:

THE SERVICE TRANSFORMATION AS AN OPPORTUNITY FOR VALUE CREATION AND EMPLOYMENT IN FUTURE



DEVELOPMENT LINES, RESEARCH AREAS AND RECOMMENDATIONS FOR SERVICE RESEARCH

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2020

DL2030

Digitale Dienstleistungen als Erfolgsfaktor
für die Wertschöpfung der Zukunft

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1. Abstract



Future of value creation

The global economy is facing drastic changes: artificial intelligence is reshaping processes, the data economy is triggering new business models, networking is creating opportunities for globalization and the need for efforts to achieve sustainability is giving rise to new values in society. At the same time, the trade war between the US and China and the COVID-19 pandemic are relentlessly highlighting the weaknesses of the global and national value creation system and pointing to a scenario of global “bifurcation” (Rapp 2020). These fragmentations are weighing on the German economy and calling prevailing value creation into question. At the same time, however, this also offers the opportunity for a reorientation of the previous view of production, service and work, which will fundamentally shape the “future of value creation”.

“Digital services as a success factor for value creation in future” – The DL2030 project

The race for technology leadership and digitization is having an impact on all industries – from the automotive industry, where Tesla is the prime example, through the monopolization of retail platforms such as Amazon, to new media empires such as Facebook, TikTok and Netflix that are shaping the everyday private lives of citizens. At the same time, the COVID-19 pandemic highlights national capacities: on the one hand, the limits to the resilience of systemically import-

ant industries such as health, trade and education become clear, on the other hand, the opportunities in convergence of the digital and physical worlds are also evident. The main challenge for Germany as a business location lies in exploiting precisely these opportunities.

The present study picks up on a central debate about the capacity of service research to shape the “value creation of tomorrow”. The projected 31% growth in traded services between 2019 and 2025 (from \$6.1 billion to \$8.0 billion) means that the employment-intensive services market will continue to grow in importance (Western Union Company 2020). Digital services in particular will experience an enormous upswing – not least because of the COVID-19 pandemic. The aim of the study is therefore to identify areas of research that will have a significant impact on the German economy, the future world of work and the interaction of citizens. The results of the study show how future research activities can contribute not only to the service economy, but also to all sectors. In this context, the project consortium, together with the project sponsor in Karlsruhe, interviewed numerous national and international experts from research and practice, analyzed existing findings from the research literature and processed and consolidated the results with academic rigor. The results of the study are the development lines, research areas and recommendations described in Figure 1.

» **4 lines of development (I - IV)**, along which new value creation models are created and which are mainly driven by service competence and digitization competence – to put it another way: “high-tech meets high touch”: Today, services represent the most important economic sector in Germany. Digitization is changing sectors at a rapid pace and service competence is increasingly impacting all industries. If Germany wants to shape the future actively, politics, science and business must take action now. The key to the competitive “value creation of tomorrow” is determined, joint action in research and implementation to meet four priority development lines

» **6 research areas (1 – 6)** illustrate how future-oriented service research can contribute to realizing opportunities for society and the economy while at the same time controlling the associated risks: in concrete terms, new service competence and digitization come together in

six research areas in which targeted research and courageous action by research, industry and politics in a network facilitates “modern” value creation in the first place and makes German services competitive – not only in the traditional service sector, but increasingly also in product-oriented industries (“servitization”).

» **4 recommendations (A - D)** have been developed for research funding, which complement the content of the research areas (the “what?”) with sustainable funding formats (the “how?”): if public funding is to accelerate and strengthen appropriate reorientation of service research, research formats must change along with the content. In terms of research policy, important steps must be taken to cope with the speed of innovation and to support businesses as carriers of the value-added innovation of tomorrow.

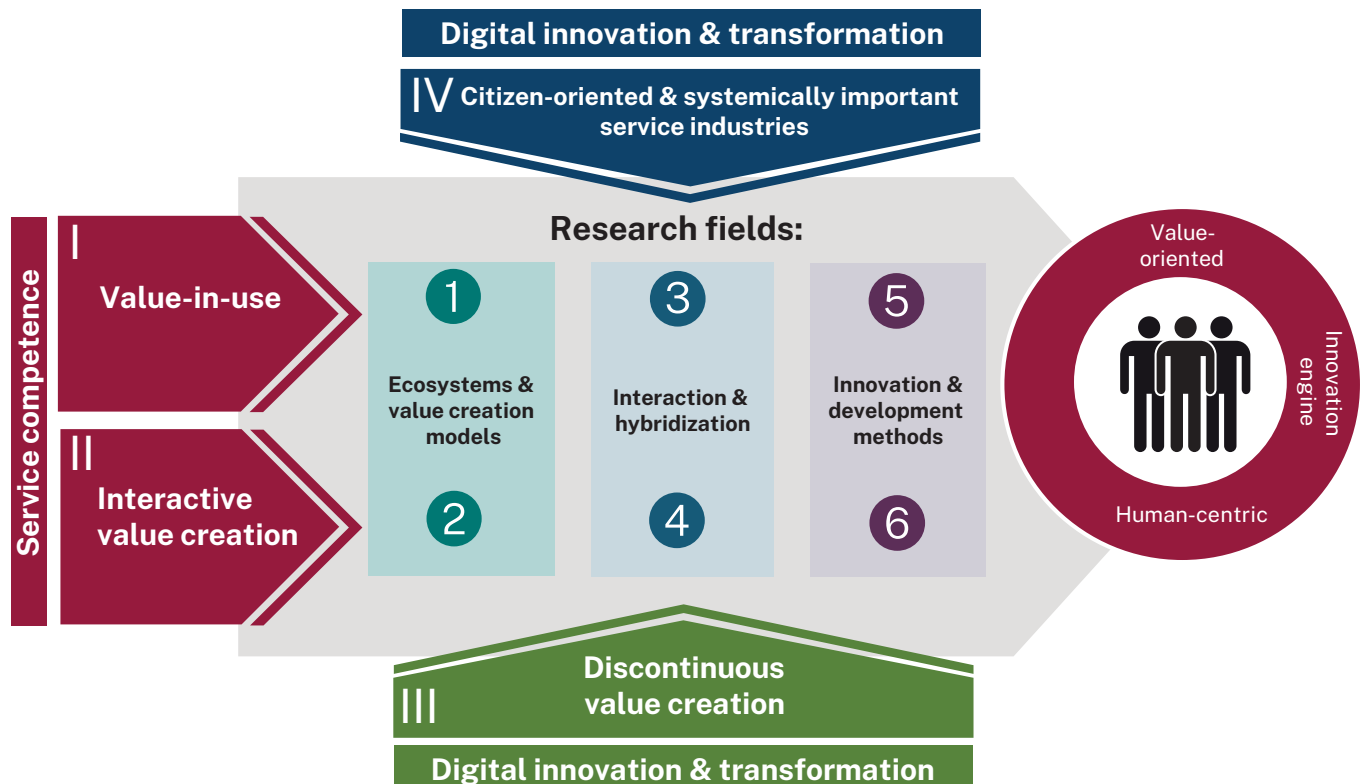


Figure 1: Summary of development lines (I-IV) and research areas (1-6) for future service research

2. Service research and the service economy

International status quo of service research

Brief summary

The core expertise of German service research lies in the field of service design and innovation. In recent years, however, it has become evident that international competition in these areas is becoming tougher and, to judge by the number of publications, the German lead is dwindling – especially in view of increasing efforts in Asia. The concept of value co-creation, which focuses on “smart”, networked services, is becoming increasingly apparent. New technologies are fundamentally changing the way we communicate, interact and add value. At the same time, service ecosystems are becoming increasingly relevant through innovative and disruptive value creation models. Based on these observations and findings, it is becoming crucial for national research into services to combine its core expertise in service design with the increasingly important concept of value co-creation.

In order to capture the status quo, academic information sources have been systematically evaluated in the DL2030 project. For the first time, more than 500,000 academic publications have been recorded, categorized and processed in terms of date and content. In order to ensure an integrated picture of the research field on this scale, innovative methods of machine learning have been used in the project. The findings can be summarized in the following three key statements:

Germany has a high level of competence in the field of service design and innovation

On the basis of international and chronological comparison, worldwide differences in research activities become clear from the number of publications: whereas it was primarily US research institutes that shaped service research up to 2004, since 2014 we have seen an upward trend in research activities and corresponding publications in Asia; in Germany and the USA, on the other hand, activities have been declining since 2010 in terms of publications in the service sector. Different national focal points are also recognizable as far as subject matter is concerned: while research in Asia focuses primarily on technological topics, increasing efficiency and the use of algorithms, the core expertise of German researchers lies in the field of service design and service innovation. This expertise can also make a significant contribution in the future to consistent and sustainable transfer of technological advances into new services and

service systems. On the one hand, this focus offers potential for positioning German research activities internationally, on the other, there is the risk of losing touch on the international scene in other areas, especially technological topics.

What is ...

value co-creation?

Value co-creation is characterized by an exchange of resources (e.g. knowledge, skills, abilities, etc.) between several actors for mutual benefit in the context of value creation activities.

Models of value co-creation form the core of service research

The idea that value creation always takes place through cooperation and exchange between two or more parties who use their resources (e.g. competencies, knowledge, etc.) to mutual advantage is what unites the service research community (Satzger et al. 2010). This means that value creation is understood as the interaction of different parties, and not as a transaction between them. Accordingly, keywords which reflect the idea of co-creation and collaboration are prominent in the central publication outlets. At the same time, intelligent and networked services demand innovations in the logic of value creation, as can be seen, for example, in the high growth rates in the areas of the “Internet of Things”, “smart services”, “machine learning” and “artificial intelligence”. Service ecosystems have consistently been one of the fastest growing areas in service research in terms of the number of publications in the last three years. Thus, one of the core topics of service research, value co-creation, is currently gaining in importance. Its application to the design of service ecosystems in practice will be one of the key challenges for future research.

What are ...

ecosystems?

By ecosystems we mean self-adapting systems of actors in which – guided by common logic and mutual exchange of resources – value creation takes place.

Distributed collaboration technologies offer potential for service systems

Value creation is increasingly taking place not only in general service ecosystems, but above all in digital service ecosystems. A structured, automated literature search clearly shows that current publications have a clear connection to technological progress. Especially topics around the Internet of Things, distributed ledger technology, fog and edge computing and the 5G mobile network are prominent. It is precisely these technologies, which service research subsumes under the concept of service ecosystems, that are driving decentralized and networked systems. Technological advances will therefore provide unprecedented opportunities to communicate, interact and create value within digital service ecosystems. In doing so, they will radically change the way value is created.

Academic expertise in Germany

Germany is characterized by a **broad network of academic expertise** comprising research institutes, universities and colleges. This network of expertise is not simply limited to a few “top” universities, but is also supported by the research funding of various ministries. This means that smaller institutions can also contribute to service research through the federal government’s funding programs. Overall, this broad base in the field of service research offers **great potential for future activities**, which should also help to prevent Germany losing its strong starting position and falling behind in

this fundamental area of value creation. An important contribution to the positioning of service research can include effective **networking of actors**, for example in the form of a **forum for German service research**, or by **establishing a dialogue between the public and academia** in appropriate formats.

The international and national service economy

With a share of over **69% of value creation** and over **74% of employees**, the service sector represents the economic backbone of Germany (Federal Statistical Office 2020a). This economic importance is the result of a trend that has persisted for years. Figure 2 shows the development of employment in Germany by sector of the economy. While the primary and secondary sectors have declined in economic importance over the past 50 years, the number of people in employment in the tertiary sector has been steadily increasing – and an end to that increase is not yet in sight. According to a study commissioned by the Federal Ministry of Labor and Social Affairs, it is clear that **employment in the service sector will continue to increase in the future** (Vogler-Ludwig et al. 2016).

Despite the high share of employment, Germany’s economic performance in the tertiary sector is only average by European standards. Countries such as the UK (83%), France (80%) and Sweden (78%) have a significantly higher proportion of people in employment in the tertiary sector than Ger-

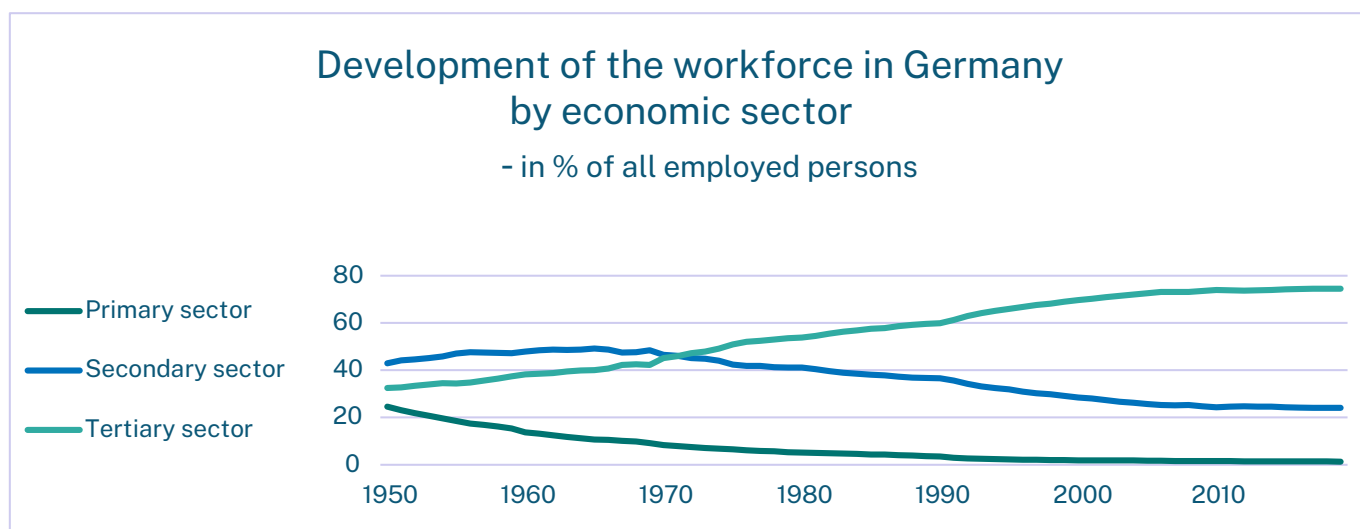


Figure 2: Development of employment in Germany by economic sector

many (74%). By contrast, Eastern European countries such as Poland (59%), Bulgaria (57%) and Romania (46%) have a significantly lower level of tertiarization (Schwahn et al. 2018).

While in most European countries the volume of value creation in the service sector has been increasing only to a small extent for many years, many countries worldwide are experiencing significantly greater growth. Over the past decade, the value creation of the **German service industry recorded an increase of one percent**, while China's service economy grew by 10% in the same period. According to a World Bank study, value added services account for 62% of GDP in Germany. Thus, Germany is only in the lower mid-range of leading nations such as China (54%), Japan (69%), France (70%), the UK (71%) and the USA (77%) (The World Bank 2019).

Based on these trends, it might be assumed that the German service sector is currently well positioned by international standards. But in view of the significantly higher

“For far too long, the global service industry has been undervalued and its importance underestimated. [...] The economic impact of COVID-19 will be felt for years to come. However, we can clearly see that those regions and industries that recognize and appreciate the value of international services will be in a better position to achieve future successes and, eventually, recovery.”
(Western Union Company 2020, p. 46)”

*- Andrew Summerill,
President Payments at Western Union.*

growth rates of other countries, **the German service sector is in danger of losing its importance internationally.** The emergence and successful development of foreign service providers such as Amazon and Alibaba highlight the danger of this trend. In order to prevent other industries losing in importance too, further efforts are necessary, especially with regard to digitization.

3. Vision of the service transformation

The vision in one paragraph:

In 2030 companies and public bodies know how to make digital value creation internationally competitive. They are able to tailor services individually for customers in real time and implement innovative solutions in conjunction with partners, while simultaneously contributing to social and economic goals. Companies are taking advantage of the opportunities of the digital world to construct value creation around a highly flexible core of software and data. In this way, innovation merges with day-to-day operations into a path of short-cycle renewal in the real market and facilitates digital operation of a physical world. Companies use digital assistants to enable their employees to create beneficial results and emotionally valuable experiences. And companies understand how to build competencies in digital ecosystems through which value creation can be scaled internationally and with a high degree of economic success. Companies in all industries can draw on digital services for value creation innovation that are reliable and easy to integrate. This design knowledge enables the service transformation: companies and institutions in Germany are taking leading international positions with digital service systems. And in traditional service industries with high relevance for citizens, the relaunch with internationally successful innovation “created in Germany” is a success.

We call this vision the **service transformation**. It is supported by four lines of development in service research that can make this vision a reality (see Figure 3, I – IV). While the first three lines of development (I – III) are based on the assumption of **fundamentally changing value creation logic** across all industries, the fourth line of development (IV) focuses on **digital innovation and digital transformation, especially in citizen-oriented and system-related service industries**.

I. The logic of services demands consistent orientation with the benefits to customers and citizens, which can be relaunched through digitization.

Value creation from the point of view of services consistently starts with the customers and users of the services. Only what helps them, what moves them forward, is really added value. What has sometimes been nothing more than lip service can now be implemented much more widely through the opportunities of digitization: Every user gets an individual solution – when, how and for the purpose he/she wants

it and at an individual price. In future, everything will involve **individualized, contextualized service** which is **pay-per-use** and **scalable**. Service research analyses how value creation is consistently geared towards use and impact – **not only in relation to individual users** but also with regard to **social goals**. Service research aims to understand how value creation models can be oriented towards social goals such as sustainable use of resources, decarbonization and social standards and be economically successful at the same time.

How do we have to redefine and measure what we mean by quality of value creation? Which actors need to work together to create new solutions? What contribution can customers and users make themselves?

II. Services are characterized by value co-creation, which is only made possible and scalable through digitization.

Only through interaction can individual achievements succeed. Value promises can then be fulfilled and a positive customer experience can be created. This is not only about function, but also about emotion. Service research has developed **design knowledge** about how **completely new value co-creation processes can be created through the opportunities of digitization**.

How can such processes and the work they involve be enhanced by assistance systems and hybrid intelligence? How can they be made transparent and comprehensible? How can the interaction between skilled employees, customers and digital systems be made as effective as possible?

III. “Everything-as-a-Service” is at the heart of discontinuous digital value creation models.

Digital value creation models are perceived to be **discontinuous** because they break with views of competition in relation to traditional products and services. In addition to the consistent focus on impact and users, digitization allows value creation to be constructed around a highly flexible core of software and data. As a result, **innovation merges with day-to-day operations into a path of short-cycle renewal in the real market** and facilitates **digital operation of a physical world**. Digital companies are renewing digital services, sometimes every minute, and more and more companies from traditional industries are adapting this approach. They are experimenting with successful service offers through direct contact with customers. This leads to an entirely new pace of change and testing of innovations. At the same

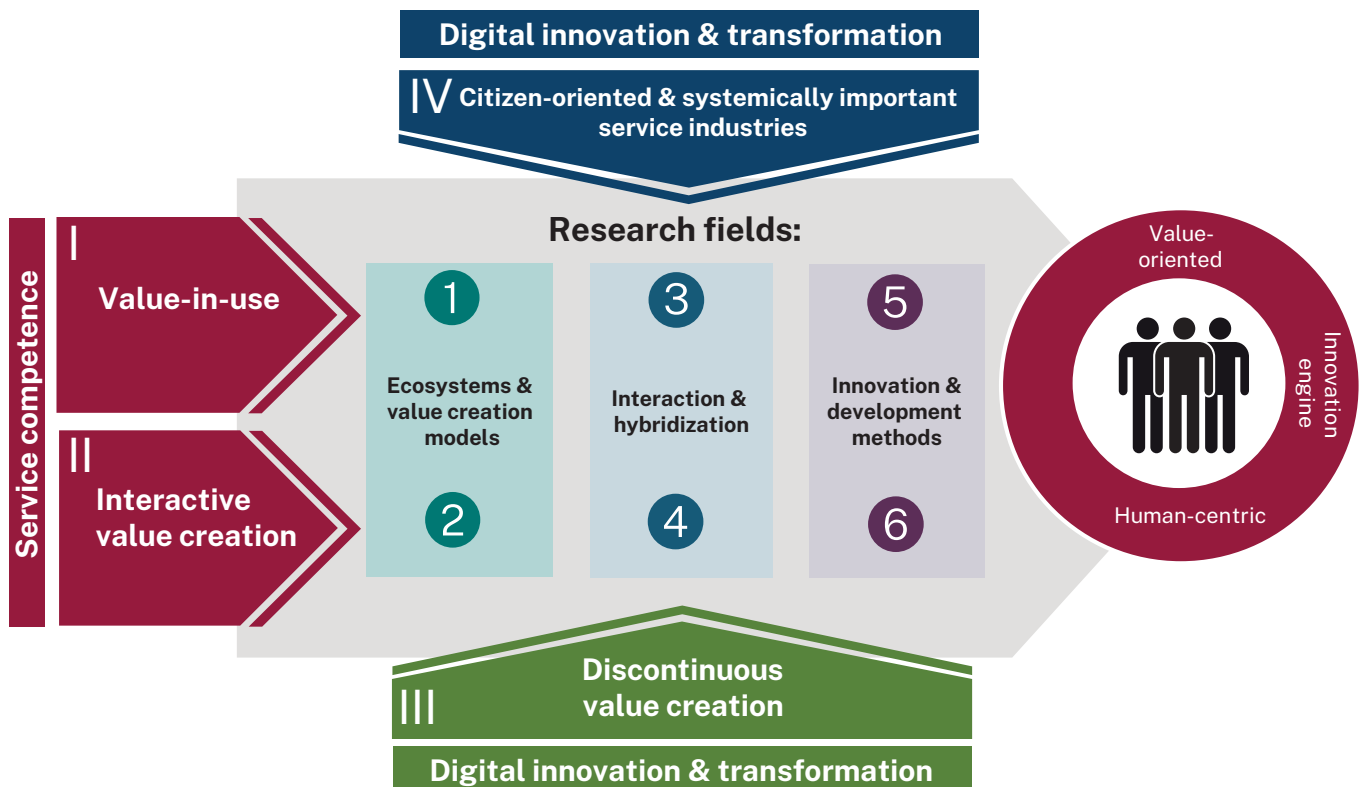


Figure 3: Development lines and research area for future service research

time, key components of digital value creation networks can be identified, designed and controlled through such highly dynamic innovation processes based on **modular architectures**. For example, they may be mediation functions on platforms or reusable cloud services. Such components differ from traditional value creation in that they are **highly scalable** and often **internationalized**. And they are crucial for the design of large value creation networks. Those who control these components also know which parts of traditional value creation are highly profitable and can selectively extend digital value creation into these specific parts of non-digital value creation. However, the starting point for this always lies in the digital sphere and this is the challenge for companies that have become successful with traditional

value creation patterns. This “competition in the realm of information” (Boes et al. 2018) is effectively a paradigm shift for business value creation. How we consistently design such value creation architectures and forms from the digital point of view is a key question in service research. **A simple digital extension of classic engineering** is not enough here – whether it is for machines, software or services.

Which mechanism determines discontinuous digital value creation? How does this new form of value creation become recognizable and tangible? Which mechanisms help with the design of these models? How are these value creation models operated and further developed in use? How can value creation systems be modeled and simulated in order to evaluate and select potential impacts and measures at an early stage?

In addition to these three lines of development which apply to all areas of the economy and public services, a fourth line of development takes a look at the challenges faced by traditional service industries, which account for about 70% of employment in Germany.

What is ...

discontinuous value creation?

In contrast to traditional value creation with relatively rigid product and service lifecycles, discontinuity provides continuous innovation activities in the specific market environment.

IV. Service research promotes digital innovation and transformation in citizen-oriented, high-employment and systemically important service industries.

Social change and digitization have a particularly strong impact on many service markets. Many of these private and public services are socially necessary, firmly anchored in the everyday lives of citizens and systemically relevant for our society, e.g. in the fields of mobility, health and the media. Digitization is driving a fundamental transformation of these services. The success of global platforms such as Amazon, Uber and Netflix demands a search for alternatives with a competitive openness to scaling and social responsibility such as fairness and a focus on standards. The economic success of high-employment sectors depends on research and innovation in this area, as does national or European service sovereignty. Today, technological sovereignty is no longer sufficient, because the market power of international players such as platform operators is not fed by technology alone, but also by the network and interconnection effects of the resulting services and their broad user base.

The service transformation must succeed so that Germany and Europe can operate successfully in an environment of new, digital value creation competition. Service research is the driving force behind this transformation. It contributes by helping to ensure that the opportunities offered by these developments are used

How can digital value creation models and processes in these markets be designed according to European values? How can transformation strategies for such services succeed? How can employment in these sectors be secured and developed further?

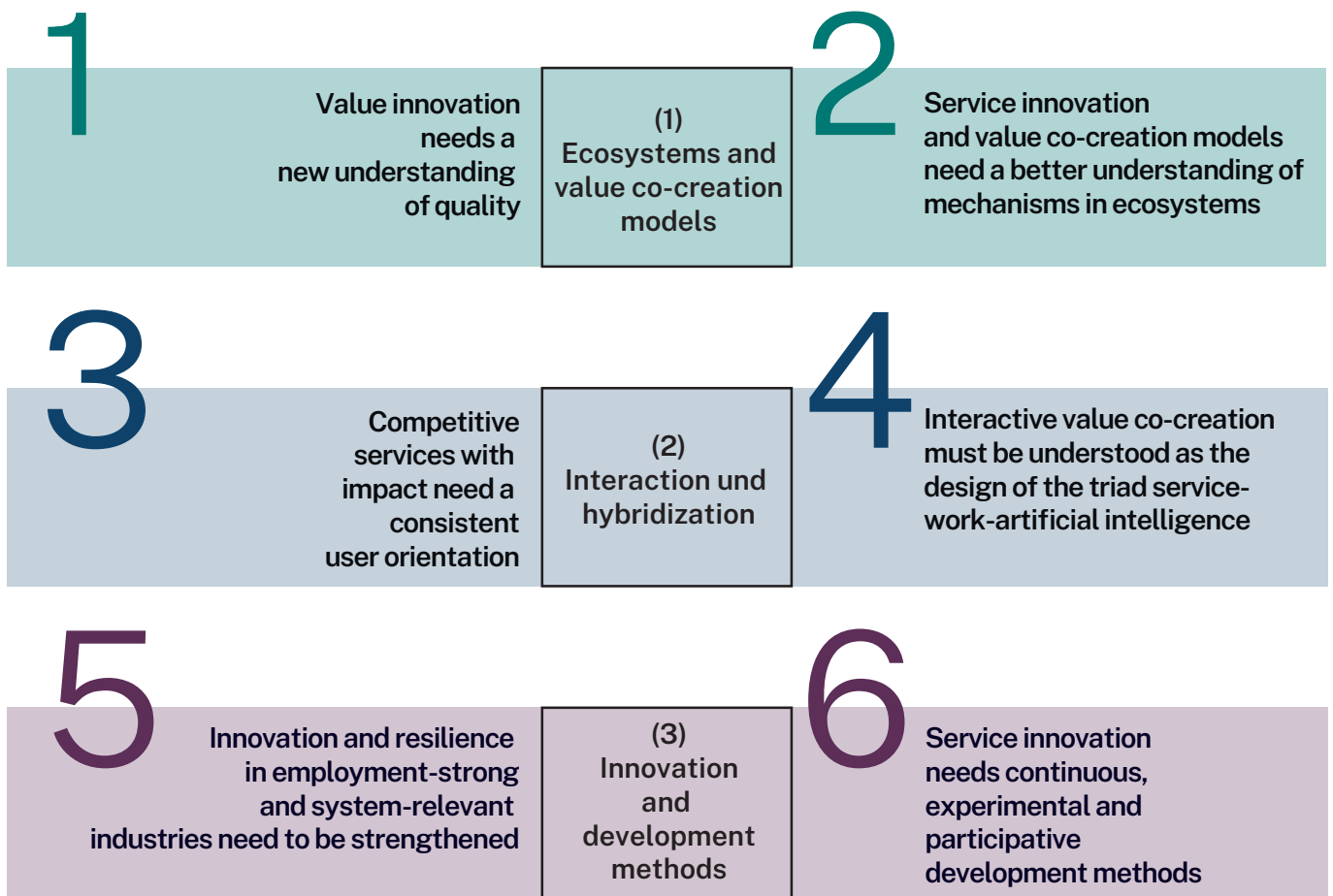
From the four development lines outlined, the literature study of more than 500,000 academic articles, which was supported by machine learning, and the 24 expert interviews with leading academics (12) and business people (12), we have identified six research areas, which will be discussed in the following section.

4. Opportunities & research areas

The four development lines of service research represent the starting point for further, more in-depth research activities. Based on the lines of development, three research blocks can be identified. The research blocks represent the concrete effects of the fundamentally changing logic of value creation on the high-employment service sectors affected by the service transformation: **(1) Ecosystems and value creation models**, **(2) Interaction and hybridization**, and **(3) Innovation and development methods**. Two research areas in each block promise far-reaching potential for future research activities. The six research areas thus form an important building block for service research in future and set out the approaches re-

quired for concrete implementation of the service transformation. Overall, the following six research areas can therefore be identified:

The six research areas will be explained in more detail in the course of this section. Development trends and a central guiding question are assigned to each of the research areas. The research needs are illustrated with examples that are supported by statements from academics with an international reputation. Finally, implications for actions and research questions are defined that make a fundamental contribution to the study of the service transformation.



Value creation innovation requires a new understanding of quality

Development trends	<p>Not only Germany, but the entire world is facing major social and environmental challenges: demographic change and increasing automation, climate change and efforts to decarbonize, and sustainable use of resources all require a rethinking of the fundamental principles of economic trade. Economic objectives must no longer be the sole target for qualitative value creation. They must be consistently supplemented by values that are shaped by the objectives of sustainability and social responsibility.</p>	
Implications for action from research area	<p>⇒ “Made in Germany” service quality must be redefined</p>	<p>Service quality must be redefined, redesigned and reestablished.</p>
	<p>⇒ Digital business models must be made competitive</p>	
<p>A research and innovation program for the future of value creation should focus on further development of the traditional concept of quality, methods of quality-oriented design and balancing of value creation ecosystems – according to the mission statement: Services “made in Germany” – Competitive. Value-oriented. Value-creating.</p>		

Quality must be seen from an impact perspective

In contrast to traditional quality in the production process, the service logic requires a **focus on the usage phase** and thus on the effects (“outcome”) of value creation. This perspective is an opportunity to meet **new social expectations** in terms of value creation, e.g. regarding demonstrable contributions to achieving **decarbonization targets**. Likewise, with the advance of learning and algorithmic systems, the demand for **transparency** and fairness of the value creation made possible in this way grows. This is also increasingly becoming a legislative or regulatory requirement (Die Bundesregierung 2018). All this shows that in the context of social and ecological change and digital transformation, a **broader understanding of the quality of value creation** can and must be developed. This new view of quality beyond traditional perspectives such as efficiency and effectiveness is not only a social requirement, but also an opportunity for differentiation through quality – which is particularly important for a high-wage country like Germany. In addition, digital technologies make it possible to measure and make transparent the achievement of quality goals.

In particular, digital services require new value discussions

The demand for sustainable value creation and the increasingly critical debate about digital forms of value creation emphasizes the need for **value-oriented design** of innovations with **transparent contributions** to a broader social system. This means that innovations in relation to sustainability, everyday life and lifestyle are becoming increasingly important for stability in the social and political environment (Falk and Mathew 2017). In addition to current discussions on sustainability and climate protection, **self-determination in the digital world** is increasingly playing a role that manifests itself, among other things, in questions of digital control such as data sovereignty and regulations on data protection. Data analysis and artificial intelligence have great potential in many areas of application, but can also lead to far-reaching encroachments on civil rights. In 2016 Amnesty International gave the WeChat app, which is widely used internationally, a rating of 0 out of 100 points in terms of data

protection, as data protection regulations permit direct release to government authorities and thus allow mass storage and disclosure of personal data and user behavior. In this respect, an attempt must be made in future in the context of new value creation innovations and digital services to establish a **value culture** and to **present it externally** as part of the general theme of increasing quality awareness of services and digital sovereignty.

Central question

How can service quality be redefined, redesigned and reestablished?

Service quality “made in Germany” must be redefined

Future service research must take a more holistic view of the quality of value creation and services. For this, new **values must be understood and defined as targets for quality**. These can be derived, among other things, from overarching social goals and the sustainability strategy (e.g. climate protection, social justice, participation and digital sovereignty, data protection) (United Nations 2015). Their attractiveness and impact on all actors in the value creation ecosystem (companies and employees, customers and users, society and the environment) must be **surveyed** and understood. In Germany, for example, sustainability, transparency and data protection are becoming increasingly important. This requires **new measuring instruments and a reorientation of existing methods of service research** (cf. Neuhüttler et al. 2019). Approaches must be **designed** that create awareness in businesses in particular of high-quality value creation in addition to economic targets that are relevant for the individual and society. In this way, objectives and aspirations are translated into concrete and tangible implementations. In addition, design knowledge and development approaches are needed that make it possible to incorporate these new quality aspects into the development and provision of services.

“Services are not an extension of products; rather, they are the core of what society, technology and the economy are all about. It is therefore primarily a question of rethinking traditional questions such as productivity. And today it is no longer about output. It’s about the value that is created. We want ever better quality of life. The outcome is therefore what matters. It is a change that we need to rethink, and we need to understand this movement.”

Possible research questions

- » *How does the understanding of quality change with social change? Which values and quality criteria are desirable in the future and how do interactions among them develop?*
- » *How must value creation systems and services be designed and operated in order to achieve the defined value and quality objectives?*
- » *How are standard customer segments composed with regard to new quality features and how can they be addressed systematically?*
- » *What effects does a value-oriented design and provision of service have on customers, employees and society?*
- » *How can high-quality data-based services be systematically developed and how can this quality be clarified and made visible in comparison to competitors?*

Specifically, it is necessary to examine which mechanisms are required to maintain the established value and quality objectives. The goal is to create a trustworthy platform that promises performance according to the principles of “Guaranteeing quality. Setting standards. Creating trust.” These requirements should be drawn up in line with the EU directives on ethically correct use of AI (High Level Expert Group on AI 2018), which the actors can meet and which can be **tracked in a transparent way**. In order to comply with defined values, quality features must be guaranteed on open platforms, since a distinctive feature of service compared to production is that complaints cannot be made and if the entire process fails, the profile and reputation of a provider may be destroyed in the worst-case scenario. On the one hand, this requires transparency about the performance of the individual actors, on the other hand it requires quality seals and standards that promise value. This is the only way to create long-term trust in open platforms, since they are subject to continuous change due to the entry and exit of actors.

Digital platforms must be made competitive

In order to respond to the change in value creation logic and to promote value creation networks, platforms are essential drivers for this development. A set goal is to establish good, **competitive platforms as an alternative to international platform monopolists**. The competitive advantages identified in connection with the “made in Germany” quality principle require further development. This raises the question of how networked services and the necessary models should be designed to prevent monopolies.

Possible research questions

- » *What quality characteristics apply to platforms and how can they be measured?*
- » *How can the long-term survival of a platform be ensured in view of dynamically changing actors?*
- » *How can privacy and security be guaranteed on international platforms?*

Example:

Otto GmbH & Co KG is a traditional trading and service company based in Hamburg.

Founded in 1949, **Otto** was a pioneer of mail order and it was still distributing a catalog as recently as 2018.

In order to differentiate itself from international competition, **Otto** is attempting to act consciously, responsibly, sustainably and inspiringly. This approach is reflected in everyday life, not only in contact with customers, but also in dealing with their own competitors.



Service innovation and value creation require a better understanding of mechanisms in ecosystems

Development trends	<p>Digitization enables actors to network for value creation to an unprecedented extent. The boundaries between the digital and the physical are becoming blurred. From a service point of view, this networking creates the conditions for achieving complex economic and social impacts through the interaction of many actors, e.g. in terms of scaling, resilience or decarbonization. At the same time, value creation mechanisms are fundamentally changing as a result of this hyper-networking. We use the term ecosystem to describe this highly interconnected and ever-changing interaction of actors. As a result of broad digitization, every sector will be affected by these opportunities for intelligent linking of various actors. Despite this importance, our understanding of the mechanisms for forming such ecosystems is only beginning – we do not have reliable knowledge of their design.</p>	
Implications for action from research area	<ul style="list-style-type: none"> ⇒ Better understanding of value creation in ecosystems ⇒ Promoting data-driven business models in ecosystems ⇒ Developing design guidelines for user-oriented design of ecosystems and services ⇒ Developing and disseminating understanding of roles and governance in ecosystems ⇒ Providing decision-making support to companies in relation to the role they should play in ecosystems 	<p style="text-align: center;">Mechanisms of ecosystems must be better understood and made usable in a systematic way</p>
<p>In order to survive in the services market in the long term, we need a better understanding of how innovation and value creation in ecosystems takes place and of how ecosystems can be sustainably operated and managed.</p>		

Ecosystems are drivers of future value creation

The study of ecosystems initially focused on platform ecosystems in which a central actor coordinates value co-creation. This form of ecosystem has attracted particular attention because it has given the central actor an **unprecedented capacity to scale value creation** and thus enabled the formation of a monopoly. **This form is currently dominated by large digital companies.** The Big Five technology companies (Alphabet, Amazon, Apple, Facebook, Microsoft) account for 40 percent of the market capitalization on the US Nasdaq technology exchange. Although most ecosystems have been shaped by US companies, there are also more and more companies in Europe that are targeting and successfully taking on such a central role in an ecosystem. Examples include Spotify, Delivery Hero, FlixBus and traditional companies such as Otto. However, there is also a growing call for greater regulation of what are in some cases extremely dominant platforms because of their strong global market position and for establishment of mechanisms for fairer competition. The design of such mechanisms and their implementation is becoming an important research question, as is the possibility of promoting alternatives through better quality assurance in these dimensions (see research area 1). These developments for consumers are increasingly reflected in the market for companies. In German industry in particular, many companies are attempting to create their own platforms and ecosystems in order to make the best use of the potential of Industry 4.0 (Kagermann 2017). However, **platforms are currently causing serious disruption in particular to traditional service industries with high system relevance and visibility in everyday life** for citizens (e.g. retail, mobility, tourism, information and media). New research and innovation efforts are urgently needed here.

Understanding architectures and roles of value creation in ecosystems

However, platform-centric ecosystems are just one of the many manifestations of highly networked and dynamic value creation. Especially for the future, one of the crucial questions may be how more **decentralized forms of dynamic networking of value creation** can be developed. Which architectures come into consideration for designing digitally enabled and often data-driven interaction of various actors? How can such dynamic ecosystems be formed? What skills do the actors need to participate successfully in such ecosystems? Traditional **roles become blurred in ecosystems** because actors often appear as prosumers, i.e. simultaneously as producers and consumers. It is also striking that ecosystems and platforms like to share their own knowledge (e.g. in the context of open-source software) when

“The management of ecosystems is becoming ever more important. What is its role in value creation? How are these ecosystems constructed? How are they managed proactively? How are incentives created to share resources practically? And we have to build trust.”

it serves the growth of the ecosystem – even though they are in direct competition with other ecosystem participants (“coopetition”). This means that **operating in ecosystems often directly contradicts the traditional notion** that all intellectual property must be protected and directly monetized. The goal of strategic and long-term partnerships is at the forefront of such activities.

Central question

By what mechanisms do ecosystems function and how can they be applied systematically?

Designing collaborative business models in ecosystems

Ecosystems create value by connecting different actors – mainly through a platform at the moment. Although initial findings about this type of value creation are available, there is still a need for research to expand understanding, since this type of value creation without its own “product” contradicts today’s value creation logic. In addition, it remains unclear how the **business model of an ecosystem can be described precisely, especially with regard to the collaboration of various actors** (Bullinger et al. 2017). While it is possible to describe the value offer, value capture and value creation for individual services within an ecosystem, a holistic description still presents us with challenges at the moment (Beirão et al. 2017; Meynhardt et al. 2016). In the same way, individual actors must be capable of capturing, designing and communicating their value contribution to the value creation of an ecosystem.

Promoting data-driven service business models in ecosystems

Ecosystems need mechanisms for coordinated value creation across many actors. These mechanisms combine sup-

Possible research questions

- » How does value creation take place in ecosystems?
- » How is the cooperation of participants in ecosystems structured?
- » What value contribution do individual ecosystem participants make?
- » How can value creation systems be modeled and simulated in order to evaluate and select potential impacts and measures at an early stage?
- » How is it possible to take a lifecycle view which includes the value creation components of products and services through the usage process?

ply and demand and thus account for a significant part of the value creation in ecosystems. At the same time, this coordination creates valuable business connections and thus ecosystems provide a variety of **options for creating data-driven business models**. Their relevance and strategic importance is considered very high by experts, especially with regard to the use of artificial intelligence. Based on “servitization”, i.e. the transformation from a product to a service-based economy, experts now also speak of “datatization” (Leimeister 2019; Schüritz et al. 2017). The associated paradigm shift for business models is often underestimated if these data-based business models are only understood as a complement to established core services. Rather, it is important to rethink value creation from the point of view of the mutually supportive changes of servitization and datatization. But there is a lack of sound design knowledge in this context. Although initial findings identify overarching types of ecosystems (Guggenberger et al. 2020), there is still **no sound understanding of data-driven business models in them**. But this is of particular importance for Germany in view of the current development in the field of artificial intelligence and in the industrial sector in the direction of smart machines and Industry 4.0 solutions (Moser et al. 2019).

Possible research questions

- » How do data-driven business models emerge in ecosystems?
- » How do business models in ecosystems differ from traditional business models?
- » How can companies be better supported in the development of data-driven business models?
- » How does the interaction of physical objects and artificial intelligence work in designing data-driven business models?

“It is more about platform creation, in terms of configuration, individualization, continuous renewal, but also institutionalization. And there are different roles on platforms that influence cooperation, coordination and individualization of multiple actors. And we have to monitor and counteract possible shortcomings here.”

Developing design guidelines for user-oriented design of ecosystems and services

Services and business models must be designed to be user-oriented. In the context of ecosystems, this poses a particular challenge: not only do a large number of actors participate in the ecosystem, but actors can also play multiple roles at the same time. The question therefore arises as to **how a variety of interests can be taken into account when designing services in ecosystems** (Neuhüttler et al. 2019). The question of how the **potentially conflicting individual interests of different actors can be aligned with a common collective interest** is particularly important. Since an ecosystem without a collective interest is incapable of action, this simple question poses an important challenge.

Possible research questions

- » How can services in ecosystems be designed in such a way that every participant benefits from them?
- » How can innovation in ecosystems be strengthened?
- » All participants in an ecosystem are users. How does this characteristic affect the design of services in ecosystems?
- » How can the different interests of the various ecosystem participants be aligned to create a uniform collective interest?

Developing and disseminating understanding of roles and governance in ecosystems

In order to develop design guidelines for creating and operating ecosystems successfully, we need a sound understanding of possible roles in ecosystems. It is already becoming apparent that the **traditional roles of producers and consumers in ecosystems are becoming increasingly blurred** and actors often behave as prosumers, i.e. as both producers and consumers. With this change, companies must face the **challenge of developing new skills to exploit the potential**. The question as to the long-term governance of ecosystems also requires further research. For example, we need to understand the **impact of the decision to opt for an open or closed ecosystem** on the ecosystem itself. Open

ecosystems in particular require a viable solution for harmonization and exchange of data. In addition, the question arises as to how the ecosystem is orchestrated in the long term and whether a neutral body is needed as a platform operator. From this point of view, the question arises in particular as to who such a neutral body might be and **what role the public sector should play in such ecosystems.**

Possible research questions

- » *What compositions of ecosystems exist and when are they used?*
- » *What is the trade-off between stability and dynamism in an ecosystem?*
- » *How can ecosystems be implemented technically? How can data be harmonized and exchanged?*
- » *Under what circumstances is a neutral orchestrator/platform appropriate?*
- » *What roles can the public sector play in ecosystems?*

Providing decision-making support to companies in relation to the role they should play in ecosystems

Ecosystems thrive on the multitude of organizations involved in them and their varied functions. Conversely, this means that **not every company needs to build its own ecosystem around itself.** On the contrary, companies can often offer significant added value to existing ecosystems and innovate their services in collaboration with other parties (Kim and Altmann 2020). Since creating your own ecosystem requires a lot of effort, **it may be beneficial for individual companies to decide consciously against building their own ecosystem and instead to participate in third-party ecosystems.** In this light, the question therefore arises as to the conditions under which it is advantageous for companies to contribute to an existing ecosystem and those under which companies should put in the effort to create a new ecosystem. The question also arises here as to the

AVIATAR is an open IT platform developed by Lufthansa Technik for digital products and services. Through a variety of applications, the platforms offer functions related to the maintenance and operation of aircraft (fleets). In particular, an open platform concept was used to promote innovation, so that third-party providers can offer their own applications via the platform in order to create value together with aircraft operators.

role in which they should contribute to an existing ecosystem. In particular, this means that each participant must actively participate in the ecosystem, since passive participation does not add value. Moreover, especially in the case of open ecosystems, it is not only necessary to participate in exchanging services, but often also in a community that contributes technically to the development and operation of the infrastructure required for ecosystems. This openness requires a change in culture and an increased willingness to share intellectual property.

Possible research questions

- » *What roles can a company play in an ecosystem and what roles are appropriate under which circumstances?*
- » *How can market saturation be measured in terms of ecosystems?*
- » *Under what circumstances is it beneficial to join an existing ecosystem instead of creating your own?*
- » *Which roles in ecosystems are suitable for which companies?*
- » *How do value creation patterns change in the usage phase of service ecosystems?*
- » *How do companies need to change in order to contribute technically to the development of open ecosystems?*



Competitive services with impact need a consistent user orientation

Development trends	<p>Service research translates the opportunities of digitization into broadly applicable competencies for value co-creation. The user is at the center of the development of impact in the value co-creation. Service research creates interactions through which services can be continuously and consistently aligned with the needs of users. In addition, interactive processes can provide remarkable experiences that make a positive impression. Competitive services must therefore be designed in accordance with the benefit they promise: from a single source, participatory and easy for the user – scalable for the provider.</p>	
Implications for action from research area	⇒ Individualization and standardization go hand-in-hand	<p>We need a consistent user focus which allows value co-creation with individual users on a large scale to individualize and dynamize performance and price</p>
	⇒ Services require a 360° perspective on the customer experience	
	⇒ Services require a 360° perspective which includes emotion	
<p>An understanding of user-oriented design of competitive services that are accepted by users is needed. It is necessary to know what criteria determine successful services. One focus is on designing “simple” services for the user. This is achieved by value-creating orchestration and collaboration of actors in the ecosystem and design of services, work and artificial intelligence by a single source. However, it is essential to balance the use of data for individualization of services with the need for privacy, for which rules are needed. In addition, mechanisms and digital tools are needed so that services can be targeted at users consistently.</p>		

User orientation as a central paradigm, human centrality as a principle

Value creation with services always starts with the customers and users of the services. Without this user orientation, it will be very difficult for service providers to meet the preferences of customers and offer beneficial services (Benkenstein et al. 2017). **Service delivery is an inherently multidimensional process that requires user involvement** (Böhmman et al. 2020). Even more than with products, the benefit of what is offered by a service lies in the perception of customers or users. This is the result of the fact that value creation is based on a co-creative process involving customers (Schymanietz and Jonas 2020). However, user orientation alone does not go far enough, since employees are also users of services and they must also contribute to successful services. A general human centrality should therefore be in the foreground which promotes company participation and qualification. **In particular, the use of AI offers a great deal of potential**, although possible risks (e.g. ethical or technical) must not be overlooked (ver.di 2019). However, the risks and potential can be counteracted by consistent human centrality.

Central question

How can services be orchestrated and aligned with the user?

Individualization and standardization go hand-in-hand

Technical progress and the diverse potential of AI and automation offer great opportunities for standardization of simple processes. This may include the initial design of a digital service in which **standardized units are offered on the basis of knowledge about other customers but they take account of the peculiarities of individual customers**. In a subsequent step, this makes it possible to create scope for the individualization of service offers. Thus, the internal resources of the provider can be used to offer customers with special requirements services that take account of their particularities. The consistent user orientation also creates special requirements of the **scalability of services** in order to make them attractive to the provider. In addition, the automation of service offerings based on artificial intelligence enables **new pricing models to be established** which allow further customer segments to be developed. For example, automated pay-per-use pricing models can be used to reach

customers who would not have bought a product due to the high cost, but who consider usage-based services attractive.

Possible research questions

- » *What criteria characterize successful services?*
- » *What form can a consistent user focus take in service innovation and delivery?*
- » *How can services be made scalable?*
- » *How must people and technology be orchestrated for competitive services?*
- » *What are the effects of the entry of artificial intelligence into the human interaction space?*

Services require a 360° perspective on the customer experience

The consistent user orientation of services requires adoption of a comprehensive perspective that goes beyond traditional approaches and places a focus on the customer experience (Baier et al. 2020). Due to the subjective perception of the benefits of services **not only quality features play a role here, but also the way in which customers' emotions are addressed** as part of the entire customer experience. This focus on the customer experience and the emotions that arise in the process should already be present in the innovation process so that services can be offered with a 360° perspective that are integrated as smoothly as possible. In this context, however, it is important not to overlook employees as a central element. Emotional aspects are mainly shaped by employees (ver.di, 2019) and accordingly also require integration of these actors in the conception of services and the associated customer experience.

Possible research questions

- » *What role do emotions play in service development?*
- » *What are the criteria for services with an emotional impact?*
- » *How must human-technology interaction be designed for services with an emotional component?*

Good services are simple services

However, the value of services is not defined by the assumed quality level of the provider, but by the acceptance by and associated benefit to the customers. To achieve this, **services for customers should be designed as simply as possible** so that there are no hurdles to using them. Complicated technical details should run in the background on the provider's side to give customers a simple experience, as Google does with its search engine, for example. Avoiding discontinuities between the individual partners in the ecosystem is also fundamental to this sense of simplicity. This should make it possible for customers **to offer services from a single source that hide the complexity of the underlying value creation network / ecosystem: customers are offered a seamless service – simply and under one roof.**

Possible research questions

- » *What form can a consistent user focus take in service innovation and delivery?*
- » *How can services be made competitive and “easy” for the customer?*
- » *How can services be designed to be end-to-end?*
- » *How can a service be made comprehensible and transparent for customers and how much transparency is needed?*
- » *How can consistent results orientation be achieved for a value contribution*

4

Value co-creation must be understood as the combination of the triad of service-work-artificial intelligence

Development trends	<p>Digitization facilitates completely new value co-creation processes. Thus, digital services are increasingly complemented by artificial intelligence as an independent actor in value creation. On the one hand, this possibility sets new standards in human-machine interaction, on the other hand, there is a gap between human capabilities and the possibilities of automation. Little is currently known about the interaction of customers, employees and AI as a triad, systematic design or the necessary framework conditions.</p>	
Implications for action from research area	<p>⇒ Better understanding of opportunities and limits of artificial intelligence</p>	<p>Value co-creation requires a sound understanding of the interdependencies between service, work and artificial intelligence.</p>
	<p>⇒ Superior value creation innovation requires integrated design of service, work and artificial intelligence</p>	
<p>Service value creation focuses on people as customers or users, employees and designers of value creation. Service, work and AI design must therefore be considered integrally as a coherent design unit for future value creation innovations. Only by balancing configurations between the participants and the framework conditions is it possible to offer beneficial, value-oriented services. In order to assess the framework conditions, the constellation of service-work-artificial intelligence must be examined on a case-by-case basis.</p>		

Artificial intelligence is increasingly becoming an independent player in value creation

Artificial intelligence (AI) sustainably changes work and value co-creation (Böhmman et al. 2018). **Self-learning systems** such as navigation have already become **part of everyday life**. Automated content analysis of customer comments enables platform operators to gain insights into customer experiences and provide decision-making support for better services. Chatbots are being introduced as a communication channel for customer conversations. Simple forms of AI such as Robot Process Automation (RPA) change workflows by supporting repetitive and monotonous tasks and reducing the everyday workload. These examples illustrate that AI has not only spread into all areas of life, but is also increasingly extended to include **the capacity to take decisions, act and learn**. The **new role of AI as an actor in service and work processes** must be taken into account in future innovation processes.

From the dyad to the triad of interaction

The examples of digital assistance systems illustrate that changes are taking place in the human-technology interaction and these are shaping service processes (Satzger et al. 2020). Despite a certain degree of hype at the moment, these **digital assistants** with self-learning capacities and visibility in the interaction space of customers are **difficult to find** so far. In many cases, the **intelligence** of the technology is **overrated**. Limitations to AI lie in particular in the learning algorithms that recognize and repeat patterns based on historical data, but cannot adapt the intelligence and capacities of human thinking and behavior. Another complicating factor is that access to learning data in orga-

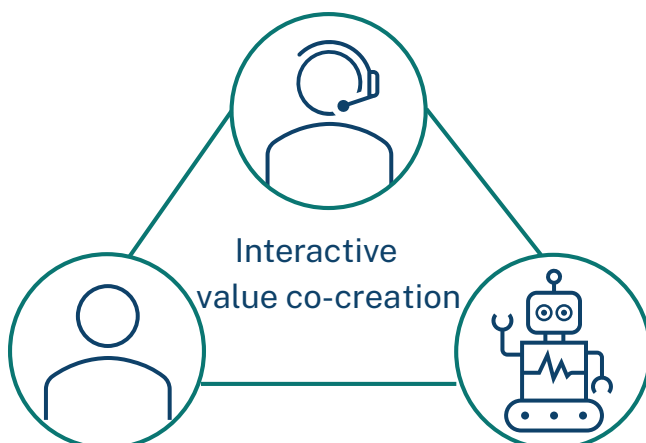


Figure 4: Development lines and research areas for future service research

“If artificial intelligence is more ubiquitous, AI will be the customer. So we need to think about how we can serve AI as a customer and actor.”

nizations is not straightforward and often does not meet the necessary quality criteria.

Therefore: **the focus is on people**. Anyone who wants to use AI must therefore be able to **assess its possibilities and limits**. Its use to support recurring tasks seems reasonable, but human judgment is necessary in many interactions between customers and employees. The view of an interaction must therefore be extended to include the **triad of service-work-AI**, which is shaped primarily by the human-technology interaction. Although there is an interaction between employee-customer-AI in customer service for example, these areas have largely been considered and researched separately in the past. Little is known about the consequences of AI as an actor in the interaction process and how the interaction should be designed.

Central question

How can the interaction between service, work and artificial intelligence be organized?

Better understanding of the opportunities and limitations of artificial intelligence

Interdisciplinary working methods increasingly extend to all areas of a company and create a platform for close integration between expertise from the areas of IT, marketing, governance, law and corporate management. Increasingly, questions regarding artificial intelligence are not only of a technological nature, but also relate to framework conditions such as the design of work processes according to the principle of “Good work by design” (Deutscher Gewerkschaftsbund 2019a), integration with interaction processes both on the customer and employee side and changes in business models. Future service research must **understand** the opportunities and limits artificial intelligence brings with it. The **ramifications** of AI for customers and employees in relation to **changes to working processes**, the **delivery of services** and ultimately the **impact on business models** of service providers must be evaluated in their interrelationship and in context.

Studies from the medical sector show: doctors detect breast cancer with an error rate of 3.5%. AI detects breast cancer with an error rate of 2.9%. Through interaction between doctors and AI, an error rate of 0.5% is achieved (Wang et al. 2016). Other studies show that collaboration between doctors and AI has increased the accuracy of a cancer prognosis by 13% (Philipp Tschandl et al. 2020). The interaction between humans and AI should therefore be investigated further in future.

Possible research questions

- » What forms can consistent user centricity take in service innovation and service provision?
- » What support options and limits does AI have in interaction processes?
- » How can services and the work in them be enhanced by assistance systems?
- » What characterizes good interaction between customer, employee and AI?
- » How is the world of work changing through the use of AI? What new job profiles are emerging?
- » How does the value of a service change through the use of artificial intelligence?
- » To what extent can AI be used to mediate individual interests in the service process?

High-quality value creation innovation requires integrated service design, work and artificial intelligence

In essence, it is a matter of **identifying beneficial interaction models** which can take on different forms of interaction between service-work-artificial intelligence **according to the application context**. For example, autonomous, self-driving vehicles have different requirements to chatbots in customer service. The context also influences the design and impact: in IT customer service, digital assistance systems have to be designed differently than in healthcare. For this purpose, the possible **design options** must be considered and weighed against each other. This means that value creation innovations have to be designed as an **integrated unit of service, work and AI**. The interdependencies and their effects on the interaction between people and technologies have not been integrated sufficiently in the context of the design of service innovations in the past, but offer the potential for value creation innovations (Satzger and Dunkel 2011). The design of interaction models therefore requires new collaborative skills. The basic principles of “good work by design”

also form part of the main idea of “human centricity” (verdi 2019) in order to maintain the self-determination of employees in respect of AI systems. For this, **the customer-employee-AI interaction**, for example, must be evaluated and designed in terms of acceptance, trust, transparency and the design of “win-win situations” in the interplay between work, customer journey and AI (Semmann et al. 2018).

Possible research questions

- » How does the interaction of qualified employees, customers and digital systems work in the best possible way?
- » How can interaction models involving customers-employees-technology be used in a targeted way? What are the requirements?
- » Which configurations of interaction models involving customer, employee and artificial intelligence generate “win-win situations” (trust among customers & employees, added value in the business process through standardization and simultaneous individualization)?
- » What are the prerequisites? What employee skills are required?

“The employee and the customer exploit their potential with the help of technologies. Interaction therefore needs to be reshaped, and we need more understanding of this kind of balance and these skills. Service systems provide connections here. So I believe that service research can make a special contribution here because we bring together technology experts, managers, engineers and interaction design experts.”

Innovation and resilience in high-employment and systemically important industries must be strengthened

Development trends	<p>The service economy is the most important economic sector in Germany. Crises highlight the need to strengthen particularly visible services with everyday relevance, both in the public and private sectors. These include, for example, retail, health, education and public services.</p>	
Implications for action from research area	<p>⇒ Sector-specific research in the service sector is necessary for international competitiveness</p>	<p>Service research must drive digital innovation and transformation in high-employment, citizen-oriented and systemically relevant industries.</p>
	<p>⇒ Services must have a resilient design</p>	
	<p>⇒ E-government and public services for citizens must be developed further</p>	
<p>Service research must strengthen digital innovation and transformation in citizen-oriented and systemically relevant industries. Everyday and public services with a high visibility must be the focus here. In addition to the sectoral view of industries, services are becoming increasingly important for citizens. The role of citizen-oriented public services, their visibility and the measures for radical transformation to digital administration in the sense of “Digital First” must be promoted.</p>		

The Munich company **FlixBus** became known for the green buses of the FlixBus brand in 2011. They are part of the everyday picture of motorways and mobility in Germany. But how did the former start-up become so successful?

FlixBus symbolizes a breakthrough in comparison to traditional transport monopolists. The goal of the founders was clear: mergers, expansions, cooperation agreements as a way of rethinking mobility and traditional value creation, moving towards discontinuous development of the mobility service. This approach explains why **FlixBus** is now operating in 30 countries and has been valued at two billion euros.

Services are at the heart of employment and visibility

The **service economy** is the **most important economic sector in Germany**: 70% of employees work in the service sector and contribute 70% of value creation – and the trend is rising (Federal Statistical Office 2020b). Measured in terms of the share of employees and gross value creation, public services, retail and healthcare are among the largest service sectors in Germany (Federal Statistical Office 2020c). This creates a high level of **visibility for customers, users and citizens**.

Digital value creation is disrupting established industries in Germany

Germany has an industrial base that has contributed to its economic success. Examples from the B2B sector such as mechanical engineering and chemistry illustrate this. The **interface with customers and citizens (B2C)** is often occupied by non-European players, however – mostly technology companies. The transformation of **high-touch into high-tech** is evident from players such as Amazon, AirBnB and PayPal.

In the future, **non-linear, digital value creation models** will have to be developed on the basis of technological options. Examples such as FlixBus show the potential German companies have in this area to radically change traditional business models – and entire industries. The **ability to orchestrate ecosystems and expertise in the field of technology** can secure a leading position for the service sector in the future. In order to achieve this, relevant service industries must be given more attention than before.

Industry-specific service research is required as an afterburner for Germany as a location for innovation

The FlixBus example illustrates that markets and industries are becoming increasingly volatile and dynamic. They require **continuous activities to design value creation innovations** in order to be able to react appropriately to changes in markets. The premise of future value creation innovations lies in particular in **coordinating market-oriented and technology-oriented design activities**. In this respect, the establishment of new value creation models requires new strategic competencies and innovation processes that promote a rethinking of previously plan-oriented innovation processes and move in the direction of creating dynamic, interdisciplinary value creation networks.

In a landscape of medium-sized economic and social actors, however, **forming new markets is a particular challenge**. In the past, this has favored market opportunities for capital-intensive platforms, which often changed scale from more homogeneous and larger home markets to the German and European markets. If a quality-based design of entire industries is to succeed in terms of social values and expectations of citizens, new approaches are needed, including in research and innovation policy. This certainly applies in particular to future fields that have a **high visibility in and impact on the everyday lives of citizens, such as mobility, health and media**. This raises the question of how networked services and the models required should be designed to prevent monopolies.

Central question

How can cross-sectional research and industry-specific research be integrated in order to address the special challenges in the design of industry-specific and systemically important services?

Services must be designed to be resilient

Due to the COVID-19 pandemic, the area of systemically important services has not only gained in **visibility** for the population, but also attained a new **status**. Coping with a crisis requires a capacity for **resilience to withstand** it (resistance), **overcome** it (recovery) and **learn** from it (creativity) (Maguire and Hagan 2007). Establishing the necessary conditions for this, such as an **intact infrastructure** and a **robust value**

creation network through the use of innovative technologies is the responsibility of business and politics (United Nations 2020). New ways to improve **interaction** and the use of technologies for better **working conditions** are necessary steps for putting the image of the industry and an appreciation of these services in a new light.

Possible research questions

- » How can systemically relevant professions be upgraded?
- » Which criteria support the status of systemically important industries?
- » How can working conditions in systemically important professions be improved through the design of work, services and technology?
- » What measures strengthen the capacity for resilience in relation to resistance, coping and learning in systemically important industries?

E-government and public services for citizens must be developed further

The **expansion of e-government** for visible public services requires a boost. In a European context, however, Germany is in the middle when it comes to the digitization of administration (see figure on the right) (European Commission 2019; van der Linden 2019).

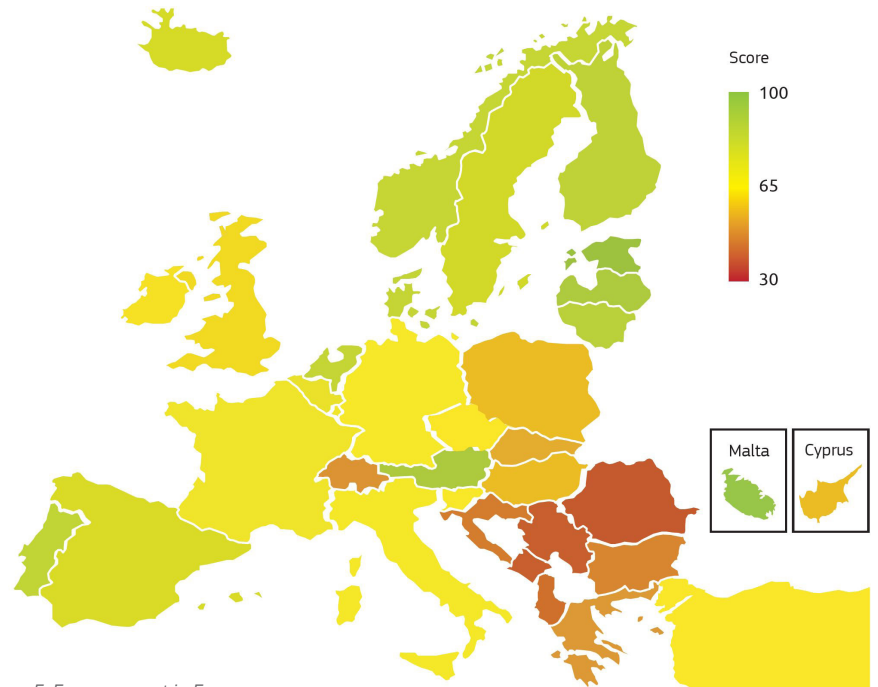


Figure 5: E-government in Europe

In addition to the reduction of bureaucracy (BDI 2019), this involves the expansion of digital services (Sopra Steria 2017), from a consistent service perspective according to the principle of human centrality: the promotion of individual and **needs-based support for citizens**. Public administration should play the role of **active supporter and advisor in the everyday concerns of citizens** and overcome the limits of process structures.

Possible research questions

- » What are the criteria for citizen-oriented services?
- » How can visibility of public services be created?
- » How must public services be designed to meet the needs of citizens?

“Services are broad and cover many different sectors. We have to deal with the trend towards complexity, in healthcare for example. You have the patient, the patient network, multiple health professionals – they have to interact with each other and create value together. The same applies to the public sector. We need design approaches that deal with the design of complex service systems for multiple actors.”



Service innovation requires continuous, experimental and participatory development methods

Development trends	Digitization enables and requires continuous experimentation in development methods and environments. These create integrated interaction of employees, customers and AI and address the perspectives and approaches required for digital service innovations in an agile and transparent way.	
Implications for action from research area	<ul style="list-style-type: none"> ⇒ The service innovation of the future requires a new design approach ⇒ Creating methods and tools for service innovation 	<p>New methods are needed that continuously support innovation in the market.</p>
	Classical, plan-oriented design theory reaches its limits in digital business models and ecosystems. The development of participatory and interdisciplinary methods promoting experimental culture is therefore necessary for impact-oriented value creation. In addition, a better understanding is needed of the interaction between digital value creation models and technological development – this requires a paradigm shift.	

An example of the application of continuous, experimental & participatory development methods is JOSEPHS in Nuremberg. This is an open innovation laboratory in which a large number of products, services and business models have been tested and evaluated by visitors in their early development phases since its foundation in 2014. In addition, JOSEPHS offers interested companies creative spaces and concepts for running innovation workshops and regular events on various topics related to innovation, its potential and implementation.

Change in innovation activities - From classic R&D to continuous innovation and improvement

A paradigm shift in innovation activities is necessary in the context of the service transformation: **moving away from traditional research and development processes to continuous innovation, which pursues continuous improvement of the service experience.** Innovation takes place for services that no longer pass through a classic life cycle (as products often do), but undergo continuous innovation in a cycle. To achieve this, it is not sufficient to master classical engineering forms as design theory (whether for machines, software or services) (Böhmman et al. 2014).

Central question

How must the paradigm shift associated with service innovation be designed methodologically?

The service innovation of the future requires a new design theory

In order to be ready for the innovations in services of the future, a new, consistently digital and customer-oriented design theory for value creation is required. This new design theory is characterized by continuous innovation and creates new forms of hybrid value creation models, the core of which is digital. This digital core is supplemented by classic products and innovative services and is continuously developed in day-to-day operation. This creates innovation that measurably increases the customer benefit of the solution. There is a paradigm shift away from the use of process-oriented methods, towards the **establishment of path-dependent and experimental approaches.** It is also important not only to establish measures that promote innovation within the framework of flagship projects, but also to anchor them with a broad scope in order to achieve competitiveness and scalability (BDI 2020). However, successful establishment of new ways of working for innovation poses considerable challenges, especially for established companies. New methods and approaches often fail because of traditional structures and processes. Sustainable models for transformation are also needed that create the necessary framework conditions for new ways of working to create digital innovation.

Possible research questions

- » *How can a new culture of innovation be established in companies?*
- » *How can data-based innovation methods be designed?*
- » *How should a design theory for digital service innovation be constituted?*
- » *Which aspects are relevant in the transformation to continuous innovation?*

Creating methods and tools for service innovation

New methods and tools are indispensable in promoting the establishment of a new design theory for value creation (Beverungen et al. 2018; Höckmayr and Roth 2017). These methods and tools should focus on **continuous innovation in the real market environment involving customers and users.** New value creation models should be created and existing ones developed through data-based experiments at a high frequency (using prototypes, implementation of minimum viable products (MVPs) / minimum viable services and experiments). The aim is to support the goals described above by a methodological process that complements existing methodological approaches for surveying individual needs according to the previous value creation logic (DIN SPEC 2018). **For this purpose, innovation models and scenarios must also be developed** which promote the acceptance of these methods and tools and anchor their relevance in society (BDI 2017). These must be anchored in companies culturally and through methods, routines and tools to transform them into successful data-driven service providers. In this context, it is also important to let citizens participate in order to further support acceptance through education (Bundestag 2019).

Possible research questions

- » *Which methods and terminology do we need for (digital) service innovation?*
- » *Which experimental spaces are most effective for service innovation?*
- » *How must innovation mission statements and scenarios be designed?*
- » *Which methods are suitable for continuous service innovation?*

“We need to go beyond the stage of MVPs. How do we run the pilot project, how do we scale and raise these MVPs, bring them back into the organization and then industrialize them?”

5. Structural recommendations

Brief summary

The further development of interactive **value creation in ecosystems** places **specific demands on federal funding formats**. On the one hand, flexibility and dynamism must be enabled in these constellations in order to provide **scope for experiments and pilot projects**. To accelerate the experiments, findings must be **made known more quickly and in shorter cycles** so that they can be applied in new experiments. This may require new constellations of research and industry, participation in which must be facilitated by the **removal of entry barriers**. On the other hand, a framework is needed that provides **long-term cooperation** of actors on common research topics. Long-term associations of **non-public and public partners should be promoted** to balance economic and social objectives. In addition, the **institutionalization of a German forum for service research** is proposed to continuously assess the changes in the market and society as they affect the resulting research needs. This is the only way to apply discontinuous innovation methods that result in competitive and value-oriented value creation innovations.

So that service research can play its full potential as the engine of digital value creation in the future, **the political course must be set for funding of research projects**. The familiar **funding formats** must be **adapted to the requirements of ecosystems**. **Ecosystems** are designed **dynamically on the one hand** in the interplay between actors, but **on the other hand** in line with an overarching goal **in the long term**. The dynamics of ecosystems are reflected in particular in **changing actors** and in a changing promise of value over time. At the same time, **establishing ecosystems** takes time and requires persistent and purposeful activities. Although today's funding formats with their sound project plans have proven themselves in many areas, efficient research on ecosystems requires funding formats that take into account the high dynamism of ecosystems on the one hand, but also the longevity of ecosystems on the other. In concrete terms, this means that funding formats must be designed for the long term, but also be flexible. Funding formats must be able to adapt to the consortium during the term according to the development of ecosystems. The DL2030 project group therefore proposes the following specific options for funding constellations.

Research & funding on a small scale – experiments and pilot projects require flexible funding formats and removal of entry barriers

A. Expansion of short-term and short-cycle funding formats for flexible research projects

A large number of research grants are characterized by a 3-year project plan. In order to make full use of the opportunities presented by service research, short-term and short-cycle funding is necessary in addition to long-term funding measures. This is particularly evident from the rapid technological change and the potential of technological innovations. Only with a **flexible range of funding measures it is possible to understand technological innovations quickly and develop their potential successfully in service and work**. In order to accelerate such research projects, free experimental spaces are proposed as real-world laboratories, such as selected hospitals or motorways (BDI 2017, 2019b; Enquete-Kommission KI 2019). Another example of a flexible, short-term and short-cycle funding format is the Federal Agency for Disruptive Innovation (SPRIN-D), which funds disruptive technologies.

B. Removing barriers to entry for new partners

Low success rates and a **high level of administrative effort** in the application phase of research funding often discourage medium-sized companies from participating in framework programs for research and innovation (BDI 2019b). In order to **reduce the bureaucracy** for small and medium-sized enterprises, **standardized and simplified application procedures** for research grants must be created. Simplification of cooperation in relation to e.g. rights and patent management is up for debate (Enquete-Kommission KI 2019). In addition, a more efficient allocation and management of funding is already being called for at European level (BDI 2019b), such as a time window of 50 days from application to conclusion of the contract (BDI 2019b). **Fast assessment and decision making**, which can be supported by digital technologies, are required for this (BDI 2019b). Removing hurdles is particularly important because in some industries and companies there is no independent R&D department and these companies are therefore dependent

on the funding formats. In addition, a stronger **consideration of start-ups in the funding landscape** is necessary. More support for start-ups is also being called for by the Enquete-Kommission Künstliche Intelligenz (Commission of Enquiry into Artificial Intelligence), project group “AI and the Economy”, e.g. the establishment of a start-up ecosystem with regional and thematic clusters and the removal of barriers to the award process. This should counteract the decline in the start-up rate in Germany over a number of years (Metzger 2019).

Research & funding on a large scale – research clusters are necessary for the establishment and consolidation of value creation innovations

C. Establishment of long-term high-tech & competence clusters for stronger networking of research projects

Service research brings value creation innovations to fruition: only through services can innovation trends develop their value creation potential, such as that offered by mobility service providers (e.g. Uber, ShareNow, FlixBus), cloud services (e.g. Microsoft Office 365) and trading platforms (e.g. Alibaba, Otto). At the same time, these developments involving platform economies and digital business models show that service research can provide impulses for both industry and research. This **transfer** must be **further strengthened by research clusters**.

The promotion of high-tech and competence clusters makes it possible to develop **excellence in key areas** in addition to grassroots research – this requires a strategy for creating specific competence clusters and high-tech clusters that work on key topics **over the long term** and **in partnerships** and thus provide **scope for experiments** – this is the only way to build and sustain dynamic ecosystems. In order to provide the necessary scope for experimental but targeted research, these high-tech & competence clusters need **project-independent funding** to ensure long-term knowledge building. In addition, high-tech & competence clusters can make an important contribution to networking of current and completed research projects. Success stories such as Clusters4Future show the effectiveness of such projects. In the future, these should be promoted further beyond regional criteria in the key areas described to create “Excel-

lence Clusters” and “Industry Labs” (Hightech Forum 2020). This can establish platforms on which opportunities for cooperation are initially explored away from any competition.

D. Promotion of networks of non-public and public partners in order to balance economic, ecological and social goals

In order to balance out experimental areas, the project team proposes scaling of value creation innovations and **the development of a legal framework to promote non-public and public partnerships**. According to the guiding principle “benefit arises through use”, experiments and pilot projects offer the opportunity to gain insights for further development in research work. To **create an impact**, these must **scale research projects** in networks and drive **further development of framework conditions** for beneficial use of innovations. For example, there is a call to **create a legal framework for platforms** which regulates their growing market capitalization (BDI 2017; Enquete-Kommission KI 2019). Further development and scaling of these platforms can in future build on the discussion of the Kommission Wettbewerbsrecht 4.0 (Commission on Competition Law 4.0), which is drawing up recommendations for action on the legal framework for digital companies and their cooperation needs in Europe. Implementation of the requirements of the “Digital Service Act” must also be carried out and evaluated sector by sector.

Strengthening innovation, employment and competition requires support for **networks comprising research, business, social institutions and the public sector**. Only in this way can goals be achieved effectively that take account of e.g. social standards (ver.di 2019). At the same time, the participation of the public sector must also create the necessary framework conditions for this, because: **digital transformation means a system transformation**. The technological possibilities must be exploited, always taking account of prevailing values, standards and the associated **framework conditions**. In concrete terms, this means that, in line with the “Innovation Deals” at European level, regulatory **barriers to innovation** must be **identified** and **evaluated** through experimental spaces. The aim must be to create application-specific benchmarks for a legal framework for innovation. An example of this is the use of artificial intelligence, which should follow ethical criteria (High Level Expert Group on AI 2018). At the same time, consideration of **application-specific scenarios** is required to **counteract overregulation** (Bitkom e. V. 2017; Deutscher Gewerkschaftsbund 2019b).

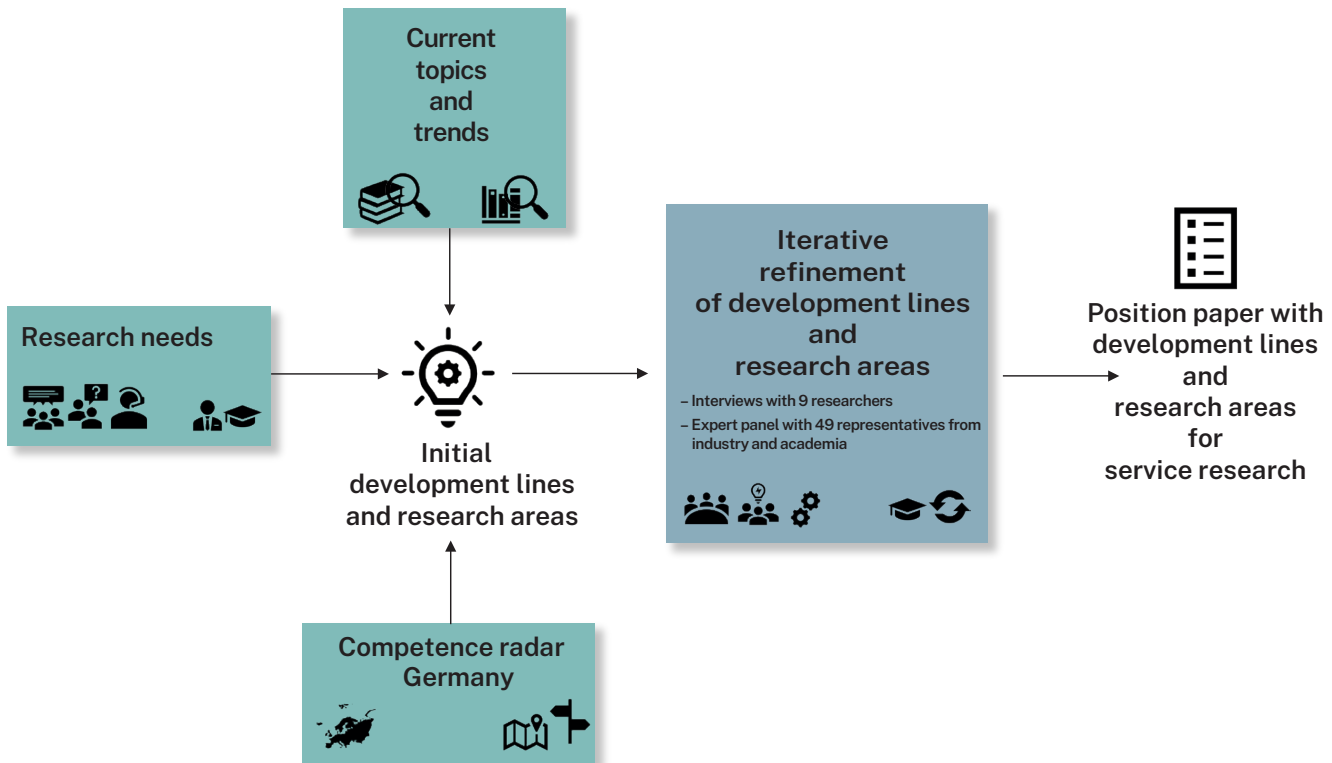


Figure 6: Overview of approach in the DL2030 project

In addition, the project team proposes **institutionalization of a German Forum for Service Research**. The aim is to establish a **regular interaction about new research challenges and key research results in a dialogue between theory and practice**. This is achieved by linking and encouraging collaboration between various national and international associa-

tions, events and activities related to service research. The focus is on making service research visible through thematic focal points and events that are supported by international **incentives for funding policy measures**. In addition, the forum would support young academics in service research, e.g. through summer schools.

6. Background the DL2030 project

Problem

The design logic for value creation is in a state of upheaval. The digital transformation as its core driver is changing the services offered, business models, organizations, collaboration and forms of human work. The ability to design digital services has the potential to form a key area of expertise in this new value creation logic. We are already noticing how technical innovations in the field of artificial intelligence (AI) and the Internet of Things (IoT) are being used primarily in the development of digital services.

In addition, digitization opens up completely new possibilities for interaction between providers and users and for the co-creation of services: with digital voice-activated assistants, machine interaction is moving into the living rooms of users, and highly personalized services are offered via mobile devices with sensors and machine learning capabilities – such as personal training assistants. In order to make interactivity and individuality usable for value creation in digital services via digital technologies, in addition to a strong focus on technology, the emphasis must therefore be placed even more strongly on human beings as users in the design of innovative service systems.

Project goal

The research project “Digital services as a success factor for value creation of the future – DL2030” aims to identify research and development needs, including suitable approaches, which contribute to the design of innovative, technology-oriented service systems with strong customer benefits – as a pioneer for the future competitiveness of the German economy. This is intended to strengthen the position of service research as an independent research area and to promote its fur-

ther development by identifying strategic research directions, potentials and needs. The findings gained in the project are documented in the form of this position paper. The research and development roadmap drawn up in this way therefore forms an essential cornerstone in shaping future research priorities in the service sector. With these goals, the DL2030 project also contributes to successful implementation of the German Federal Government’s High-Tech Strategy 2025.

Approach

The findings presented here were developed according to an academic system. The procedure can be divided into two phases – an exploratory phase and a validation phase. The aim of the exploratory phase was to review and assess the status of service research. Three core activities were carried out for this purpose: In a first step, previous research results were compiled for further analysis. More than 500,000 academic publications have been analyzed using machine learning (“topic modeling”) methods in order to be able to carry out the broadest and most comprehensive assessment possible. As a result, a broad understanding of service research has been built up – comprehensively and objectively. The comprehensive thematic review of academic publications was supplemented by an extensive interview study involving 24 experts from academia (12) and practice (12). In addition to validating the findings of the systematic review, the focus was on identifying further research needs in service research. The findings of the thematic review and interview study were rounded off by the creation of a competence radar system to build up an overview of expertise in the field of service research in Germany. In total, the competence radar system comprises approximately 600 publicly

funded research projects spread over around 180 universities, colleges and research institutes. In addition to the research activities, activities in the field of university teaching for training the managers of tomorrow were also compiled. On the basis of the results and findings obtained, the project consortium subsequently identified initial research needs and structural recommendations for action.

In the second phase of the project, the research needs and structural recommendations for action that had been identified were evaluated as part of a Delphi study. In concrete terms, this means that the research requirements and structural recommendations for action have been reviewed iteratively on the basis of the feedback received. The recommendations described in this document are the result of the consensus of all the academics involved in the Delphi study. Figure 6 summarizes the approach of the project.

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On 28.11.2020, the vision of the service transformation, the research areas, the structural recommendations and the establishment of a German Forum for Service Research (DF)² were presented to a selected group of participants from politics, research and industry and discussed with them. That discussion has also been incorporated into the paper. The DL2030 team of authors would like to thank the following for their constructive feedback and support for our ideas:

Martin Beckmann	ver.di	Prof. Claudia Lehmann	HH Leipzig
Prof. Daniel Beverungen	University of Paderborn	Dr. Lothar Meier	Infraserv GmbH & Co. Höchst KG
Dr. Bernd Bienzeisler	Fraunhofer IAO	Thomas Meiren	Fraunhofer IAO
Prof. Andreas Boes	ISF Munich	Dr. Kyrill Meyer	IFDT – Institut für Digitale Technologien
Mark Brandes	IBM Germany GbmH	Christian Mühlrodt	Itonics GmbH
Christofer Daiberl	JOSEPHS	Jens-Ernst Müller	Robert Bosch GmbH
Prof. Michael Dowling	Münchner Kreis	Dr. Michael Müller-Wünsch	OTTO (GmbH & Co. KG)
Dr. Wolfgang Dunkel	ISF Munich	Jens Neuhüttler	Fraunhofer IAO
Maximilian Fallbacher	Carl Zeiss Digital Innovation AG	Prof. Alexander Pflaum	University of Bamberg/ Fraunhofer SCS
Michael Fischer	ver.di	Prof. Jens Pöppelbuss	Ruhr-University Bochum
Hendrik Franke	VAIS Verband für Anlagentechnik und IndustrieService e.V.	Prof. Susanne Robra-Bissantz	TU Braunschweig
Prof. Martin Gersch	FU Berlin	Dr. Sebastian Saxe	Hamburg Port Authority AöR
Alexander Gogoll	Siemens AG	Christoph Schmitz	ver.di
Matthias Gohl	Carl Zeiss Digital Innovation AG	Dieter Schönfeld	AFSMi
Prof. Matthias Gouthier	University of Koblenz	Prof. Martina Schraudner	TU Berlin
Dr. Sven Hallscheidt	DIHK	Prof. Carsten Schultz	CAU Kiel
Kathrin Haug	teamX.digital	Michael Schulz	Iteratec GmbH
Agnes Heftberger	IBM Deutschland GmbH	Ramon Somoza	Kundendienstverband Deutschland (KVD) / IBM Deutschland GmbH
Benedikt Höckmayr	JOSEPHS	Oliver Stübs	Infosim GmbH & Co. KG
Dr. Carsten Holtmann	IBM Deutschland GmbH	William Taurel	AFSMi
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