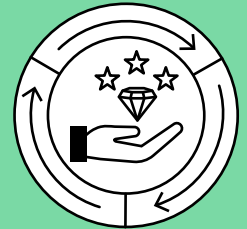
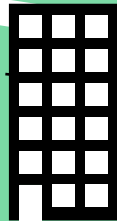


OPEN SERVICE LAB NOTES

HARMONIZING INNOVATION PROCESSES



EDITORIAL

Dear Reader,

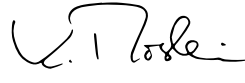
in this issue, you will learn how to unlock the great potential that lies in harmonizing your organization's innovation processes for developing smart product-service systems (smart PSS). This concept refers to the use of digital technologies to add value to your physical products by adding additional service components. Besides enriching the customer experience, this approach promises additional or increased revenue streams for your business. However, the development of such systems requires a high level of alignment between different actors inside and outside your organization. In addition, many companies lack the skills required for the development or are faced with internal conflicts that hinder the innovation processes. After a brief introduction to the relevance and background of smart PSS, you will understand the vast possibilities that lie within this concept for your business development. Our authors have also prepared articles with essential tools and knowledge to help you overcome these challenges outlined above and guide you with step-by-step instructions to optimize or "harmonize" your innovation processes. Finally, we conclude with three case studies that illustrate the practical implications of a real-life project.

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

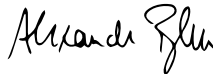
Feel free to join our conversations online and access all previous issues at OSLNotes.com.



Angela Roth



Kathrin M. Möslin



Alexander Pflaum



Prof. Dr.
Angela Roth

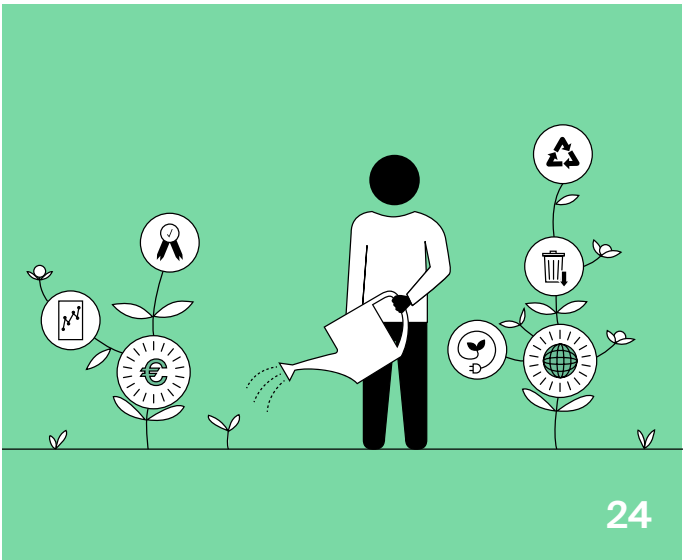
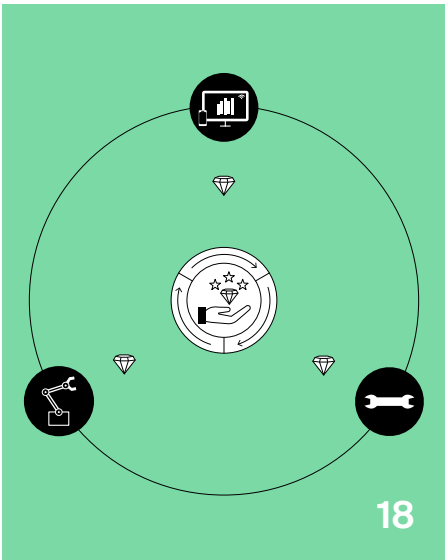
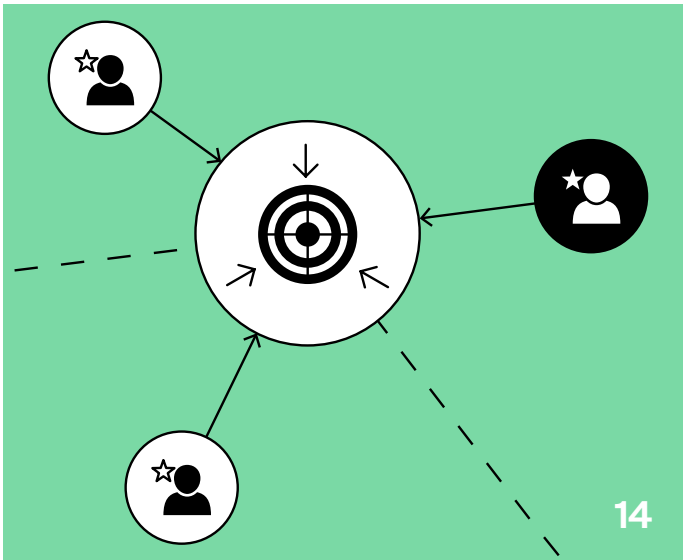


Prof. Dr.
Kathrin M. Möslin



Prof. Dr.
Alexander Pflaum

CONTENT



06

Diving into the world of smart PSS

Explaining the relevance of smart PSS.

08

Key challenges in the development of smart PSS

Introducing important aspects for business application.

10

Mastering the challenges

Presenting a solution approach.

14

Essentials worth noting

Providing insights into crucial factors for success.

24

More to consider

Highlighting sustainability, barriers, skills and use cases.

34

Additional information

Informing about project related literature.

DIVING INTO THE WORLD OF SMART PSS

“Smarter” than a Robot

Imagine a company that provides robots—machines that you can physically see and touch—for work on the shop floor of a plant. They are a good product for carrying out repetitive plant tasks accurately. However, practitioners like robot providers need to consider the question of how their companies can extend their product offerings, tailor them to customer needs, and make them even more valuable. The short answer is by expanding their services and complementing them with digital technologies.

The imaginary robot provider could offer additional services, such as maintenance and repair, to ensure the functionality of the robots at the customers' plant. Digital technologies come into play when such services are digitalized and could include, for example, an application that would allow robot operators to control the robots remotely when necessary. These powerful combinations of products, services, and digital technologies are called smart PSS.

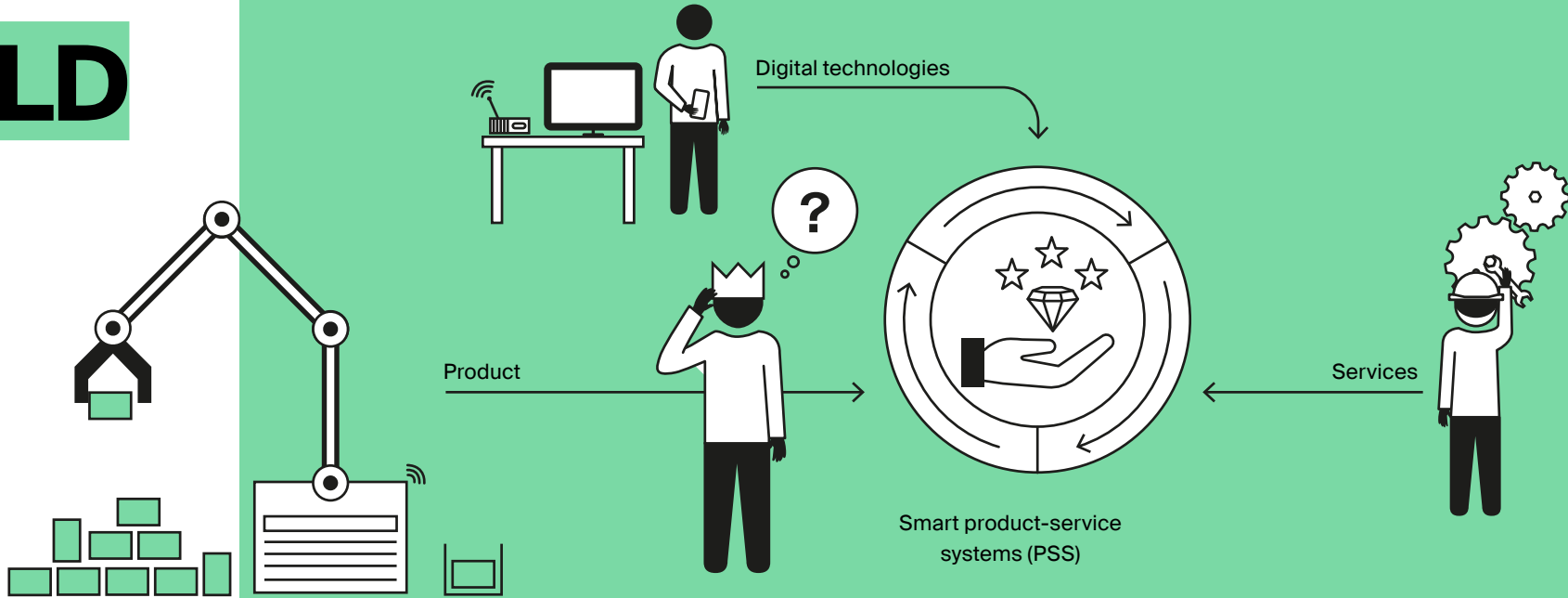
Overall, it is beneficial for companies to go beyond selling physical products by turning them into smart ones using digital

technologies and introducing value-adding services. This guarantees a much richer customer experience and allows everyone to profit from our digital world by using the tools and support provided by additional digital technologies and services.

Why are Smart PSS Relevant?

In today's digital world, the widespread use of technologies is opening up exciting new opportunities for businesses to create personalized experiences for their customers. Imagine the value of products and services that not only meet your needs but go the extra mile to deliver digital solutions that enhance your overall experience!

Think of smart PSS as more than just smart products—gadgets with smart technology features. Smart PSS go one step further by bundling products, services, and digital technologies. This means that you not only receive a physical item equipped with digital technologies, but also a range of personalized services tailored just for you. To give you a real-world example, a company might not only sell you a device, but also offer you a suite of digital tools to make the device work better. For robots, this means that



in addition to assembling products, smart PSS provide detailed analytics on the success of assembly processes and when the robots need maintenance. This kind of integration is a win-win situation: the customer benefits from enhanced functionality, and the provider benefits from customer satisfaction.

Additionally, one of the exciting aspects of smart PSS is their potential to drive sustainability. By combining products, services, and digital technologies, companies can create offerings that are convenient, environmentally friendly, and socially responsible. These three benefits are a step toward a more sustainable future.

So, what does it take to develop smart PSS? Well, it is not a simple process. It involves carefully balancing the development of the product, the services, and the digital technologies simultaneously. This can be a huge challenge, especially for smaller companies. To make things easier, we identified three major challenges in smart PSS development that can be overcome by harmonizing innovation processes—finding ways to streamline and seamlessly integrate these different aspects of the process.

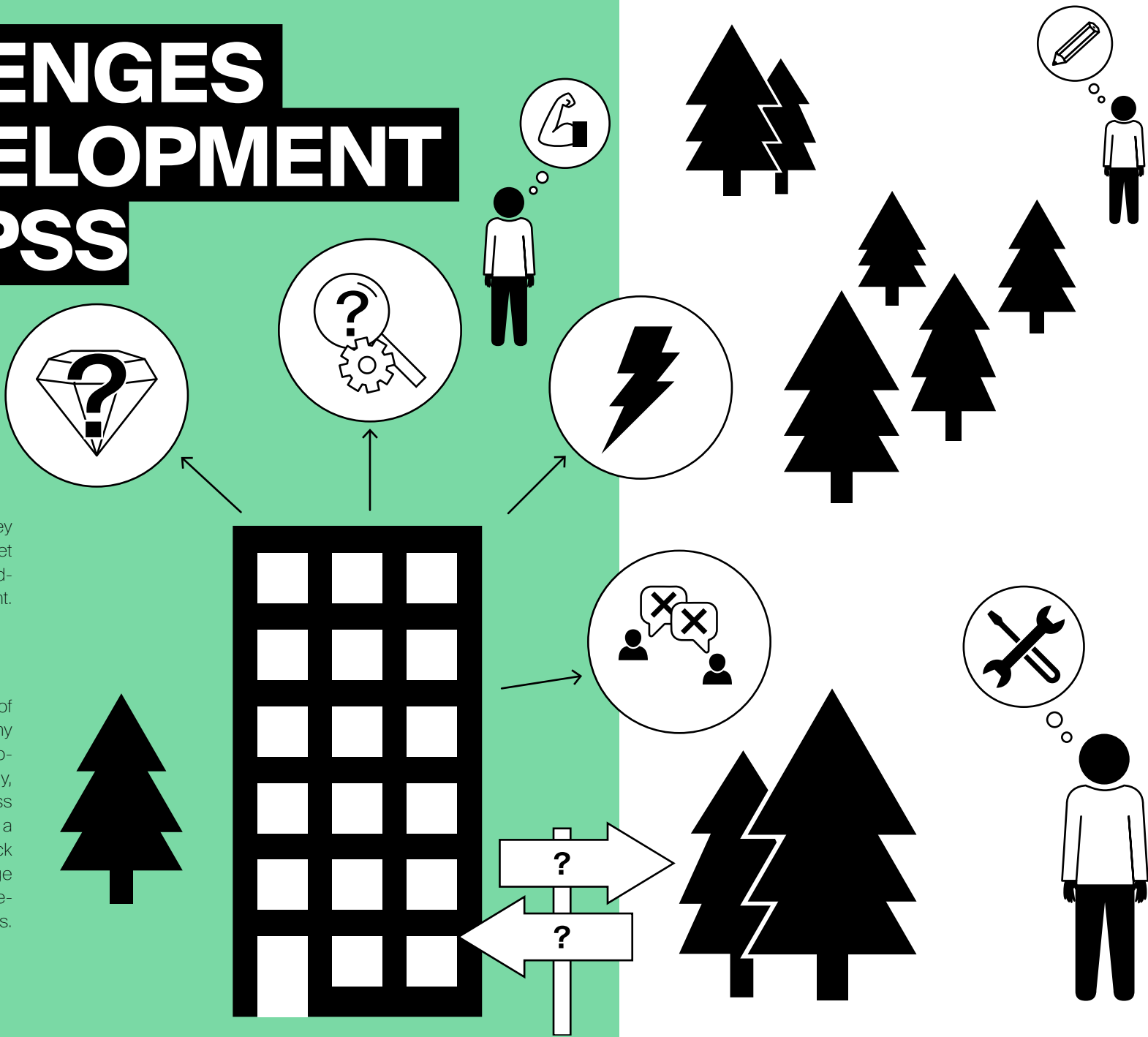
In short, developing smart PSS means creating bundles of products, services, and digital technologies that are personalized to meet customers' needs. These systems benefit not only providers and customers but also the environment and society. Building a smart PSS can be complex, but after identifying the key challenges, there are ways to simplify the innovation process through harmonization.

KEY CHALLENGES IN THE DEVELOPMENT OF SMART PSS

When companies seek to realize the potential of smart PSS, they face several key challenges that require practical solutions. Let us dive into these challenges and explore how they can be addressed to pave the way for successful smart PSS development.

Lack of Methods

For small- and medium-sized enterprises (SMEs), the lack of established methods for developing smart PSS is a hurdle. Many companies enter uncharted territory when attempting to choose the right methods for building smart PSS and, particularly, when assessing the economic viability of smart PSS business models. Whether a company can successfully transform into a smart PSS provider in the long term, being hindered by a lack of methodology, is a major concern. Overcoming this challenge requires the company to identify and adopt appropriate development methods to ensure a clear path to sustainable success.



No Common Understanding of Added Value

The development of smart PSS involves unique complexity, and value is created by three different components: products, services, and digital technologies. A challenge arises from the different perspectives of the various stakeholders involved in innovation processes, who tend to emphasize the components that align with their own domains. To address this challenge, it is crucial to achieve a harmonized understanding of value creation across the board. This requires a unified vision through which all stakeholders recognize and contribute to the value of each component of a smart PSS.

Coordination Across Departmental and Corporate Boundaries

Creating a smart PSS with a shared understanding of value creation requires more than individual contributions; it requires seamless coordination of product, service, and digital technology innovation processes. Achieving this coordination is no mean feat, as it involves aligning efforts across departments and even entire organizations. The key is to foster collaboration and cross-functional development activities among these diverse stakeholders. Often, organizations struggle to fully understand the impact of unresolved challenges, and this lack of awareness can lead to promising smart PSS development initiatives failing. For example, if decision-makers within manufacturing companies do not recognize the value of a service or overestimate the cost of digital technology implementation, projects to develop smart PSS can stumble. Similarly, if designs for bundling service concepts with digital technologies are isolated from the business, they can lead to usability issues and a lack of adoption by customers and other organizational departments (e.g., sales departments).

By addressing these practical challenges head-on, companies (particularly SMEs) can navigate the uncharted waters of smart PSS development and unlock their full potential, with a clear understanding of methods, value harmonization, and cross-functional collaboration serving as their compass to success.

SOLUTION APPROACH:

MASTERING THE CHALLENGES

Harmonization is Key:

Overcoming the previously mentioned challenges requires strategies specifically tailored to the needs of SMEs. So, you might ask, how exactly does harmonization work?

The SmartHaPSSS approach facilitated a deep dive into different companies' smart PSS innovation processes, with a focus on finding ways to synchronize the development of products and services and create harmonious workflows. The initial results showed that digital technologies play an important role in enabling this synchronization. However, it quickly became evident that synchronization alone is not enough; it is equally important to provide SMEs with training and support in developing smart PSS. Since a one-size-fits-all approach clearly cannot meet the diverse needs of different companies, the SmartHaPSSS approach tries to adapt methods to each company's unique needs.

However, the synchronization of processes and the adaptation of methods still fell short of full harmonization, so all relevant actors and stakeholders, including those involved in digital technology development, were invited to the table to develop smart PSS, which led to the revelation that digital technologies are not just a sidekick to smart PSS—they are a vital component that needs to be harmonized with the other components. But there is more to this story. Bringing together stakeholders with different backgrounds and expertise was still not the final answer to harmonization. A common understanding was essential, and each player needed to understand the value that a smart PSS would bring to his or her business. They needed to share the understanding that providing a smart PSS is better than simply providing a product or service.

This shared understanding was the key to the stakeholders accepting process adjustments, embracing new methods, and collaborating effectively through new team dynamics.

Harmonization Steps

Based on the previous presented insights, the SmartHaPSSS approach was developed in a collaborative setting with organizations as a guide to achieving smart PSS harmonization within SMEs. This approach sets out clear prerequisites and steps and guides practitioners through the innovation process. It includes explanations of various factors that are critical to smart PSS development harmonization. The SmartHaPSSS approach provides the tools to seamlessly navigate the challenges and complexities of smart PSS development and create a path to success that is tailored to an organization's unique journey.

This approach addresses the challenges discussed earlier and provides a clear path forward. At its heart are three essential harmonization steps to pave the way to smart PSS success.

01. Harmonize actors: The first step is to encourage all key players to come on board and align their efforts. This means coordinating the efforts of those working on product development, service development, and digital technologies development. It is essential that everyone is on the same page.

02. Harmonize innovation processes: The second step focuses on refining innovation processes. Building a smart PSS requires the tight integration of different elements, which is where the SmartHaPSSS approach comes in, providing a framework for managing integration smoothly.

03. Integrate value-added understandings: Building a smart PSS depends on understanding the value it offers. The third step involves aligning everyone's understanding of the value of the respective smart PSS. This means bridging gaps in understanding and ensuring that each member of the team recognizes the value contribution of each smart PSS component.

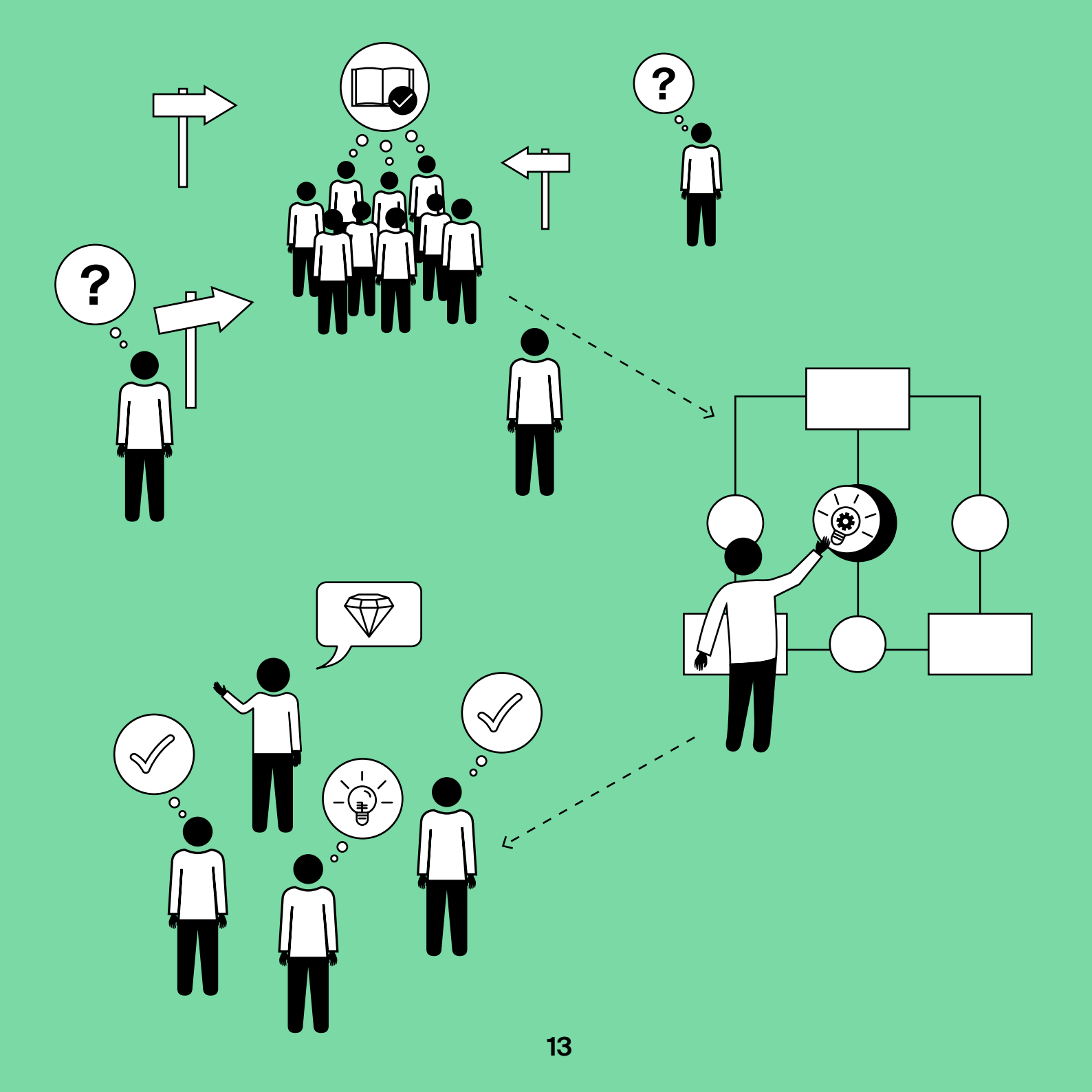
The harmonization process involves coordinating activities and viewpoints across the board, and the SmartHaPSSS approach provides methods and tools for guiding you through this smart PSS development process. The

relevant resources are accessible online at www.smarthapsss.de. They will help you identify points of harmonization, key actors for coordination, structured development activities, and a common understanding of added value.

The practical implementation of these smart PSS development activities is supported by exchange formats, with special attention given to aligning the understanding of value across functions. This alignment is key to the subsequent steps of product, service, and digital technology development. In addition, the approach emphasizes understanding the different stakeholders involved in an innovation process, which will help you manage environmental, economic, and social impacts from the outset and empower you to actively manage them.

With this approach, you can expect to overcome typical smart PSS development challenges. The result? Increased customer value and environmental and social benefits.

The following chapters will explain how you can start your own smart PSS development, the tools you can use, and the best practices you can apply to make your development journey a success.



ESSENTIALS WORTH NOTING

HARMONIZE ACTORS: GAIN INSIGHTS INTO ACTORS AND STAKEHOLDERS

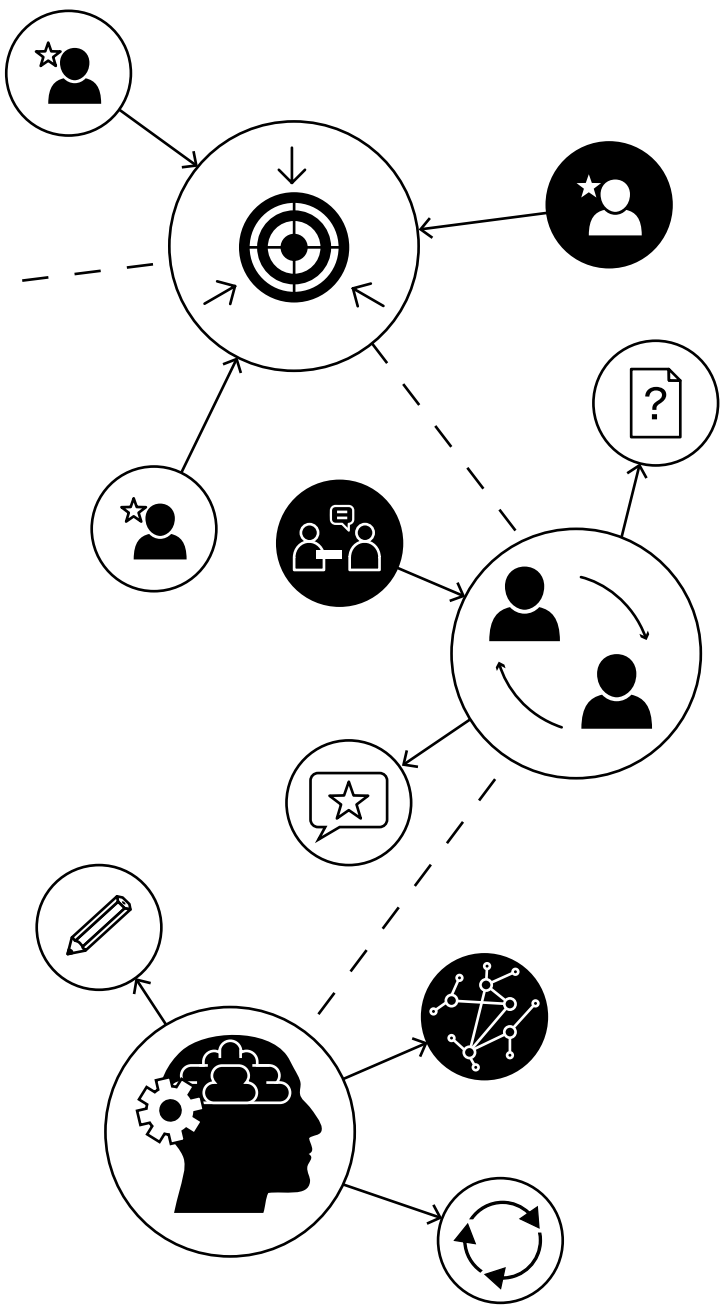
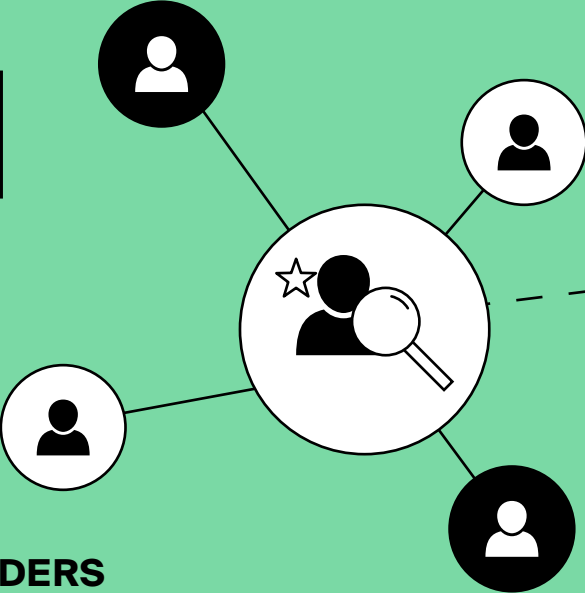
The development of a smart PSS is a collaborative endeavor involving several actors with different skills. Bringing these actors together to collaborate in the innovation processes is essential for success. The key terms actors and stakeholders are essential to understand. Actors actively drive the innovation processes, such as in product development teams, or as external partners, such as IT service providers. Stakeholders who are not actively involved in the development, but who are important for decision making in the development of smart PSS, may have hidden agendas and may be affected by the actions of the actors. Think of them as shareholders in a company's innovation. This collaboration between actors and stakeholders can represent challenges, but with the right approach, they can be overcome.

Two Main Challenges

01. Internal conflicts: Collaboration can lead to conflicts between internal actors due to different goals and skills for smart PSS innovation.

02. External skills: The development of smart PSS components may require skills that are not readily available within the organization, leading to the involvement of external partners.

To address these challenges, it is essential to harmonize the development of smart PSS components, as well as the collaboration between different actors. This involves a shift from linear value chains to service ecosystems, emphasizing collaboration within and between organizations with different skills.



Harmonization Steps

01. Identify keystone actors: You should identify individuals or departments in companies in the service ecosystem that can orchestrate innovation by managing interactions between different actors. Keystone actors are well connected within a company and beyond and often work in overlapping business units, including innovation management, business development, or project management units. These keystone actors are responsible for educating employees, initiating exchange formats, suggesting adaptations of the innovation processes, and bringing potential external partners into the fold.

02. Foster alignment: The alignment of actors and stakeholders is essential. To develop smart PSS successfully, your company may need to change its identity (e.g., from a car manufacturer who sells cars to a mobility provider selling cars in combination with smart services). Both managers and employees must be engaged in driving such change. The value proposition of a smart PSS may differ for different stakeholders, so creating awareness and aligning everyone toward common goals are critical.

03. Engage customers: You should involve both smart PSS buyers and end users, as not every customer is the same as a smart PSS user, especially in a business-to-business context. Iterative feedback loops from customers and observing users' interactions with your products can provide valuable insights. Understanding their motivations for engagement is vital; they may want to showcase their expertise, benefit from partners' capabilities, or strengthen relationships.

04. Embrace ecosystem thinking: To manage complexity, you should adopt a service ecosystem mindset to allow you to orchestrate collaboration between actors and stakeholders and leverage their diverse capabilities. Mapping a service ecosystem helps identify dependencies and manage communication to achieve the common goal of smart PSS innovation.

Incorporating these practical steps into your smart PSS development process will help you create a harmonious environment in which actors collaborate effectively, stakeholders are aligned, customers are engaged, and a thriving ecosystem drives innovation.

HARMONIZE THE PROCESS: GAIN INSIGHTS INTO THE DEVELOPMENT

The journey to developing a smart PSS can be complex due to the interplay of three critical components—product, service, and digital technology. Creating such an integrated offering requires a new approach—one that aligns the development of all three components simultaneously and requires a fresh perspective and restructuring. Let us break this approach down into practical steps.

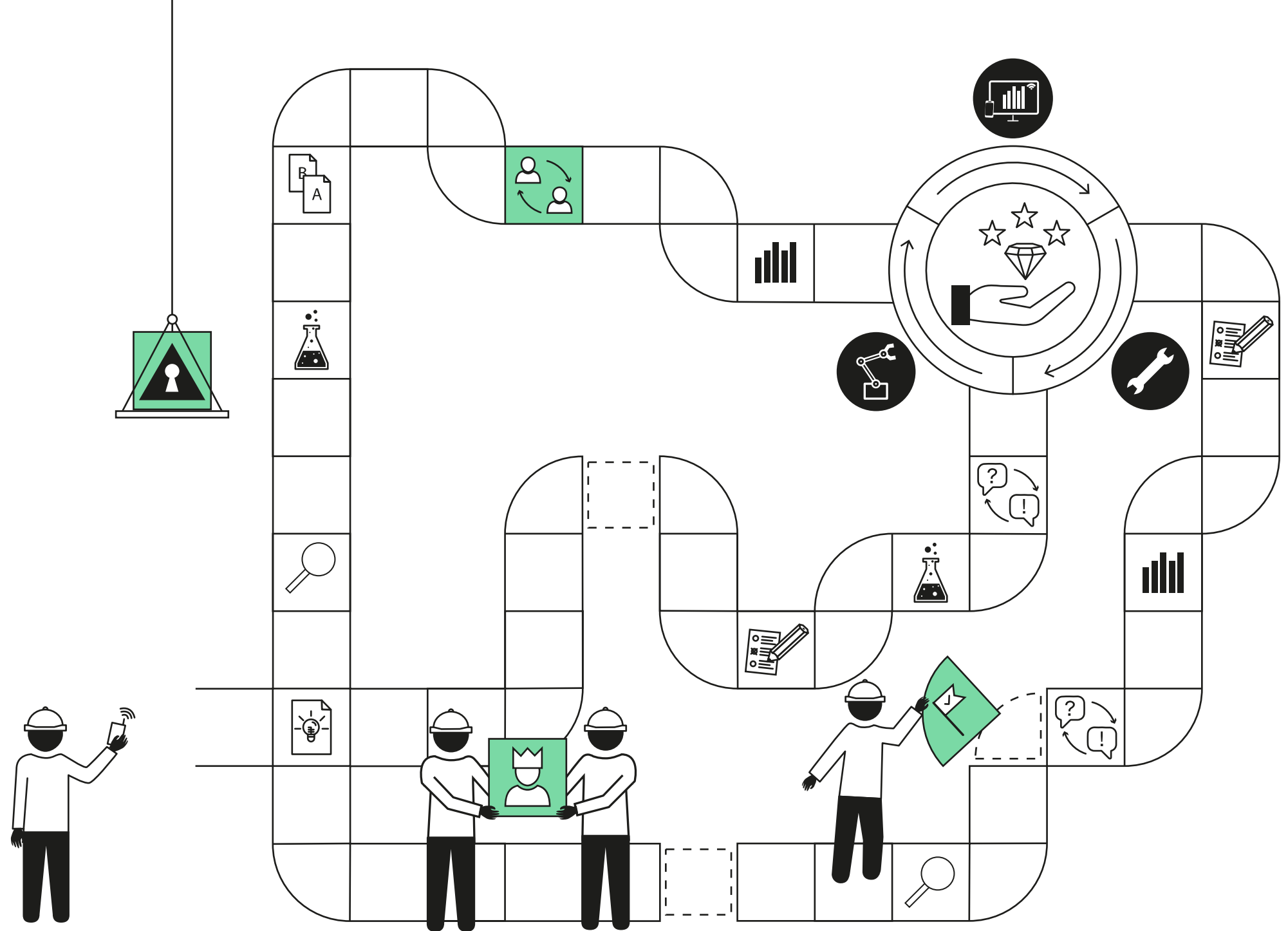
01. Hybrid innovation process: To ensure seamless development, choose a hybrid innovation process that combines the best of both worlds—a stage-gate process and agile development—to integrate the agility of service development sprints within a linear stage-gate framework. This is essential for meeting the dynamic requirements of smart PSS. The key is to harmonize the development of all components while involving the right stakeholders at each step.

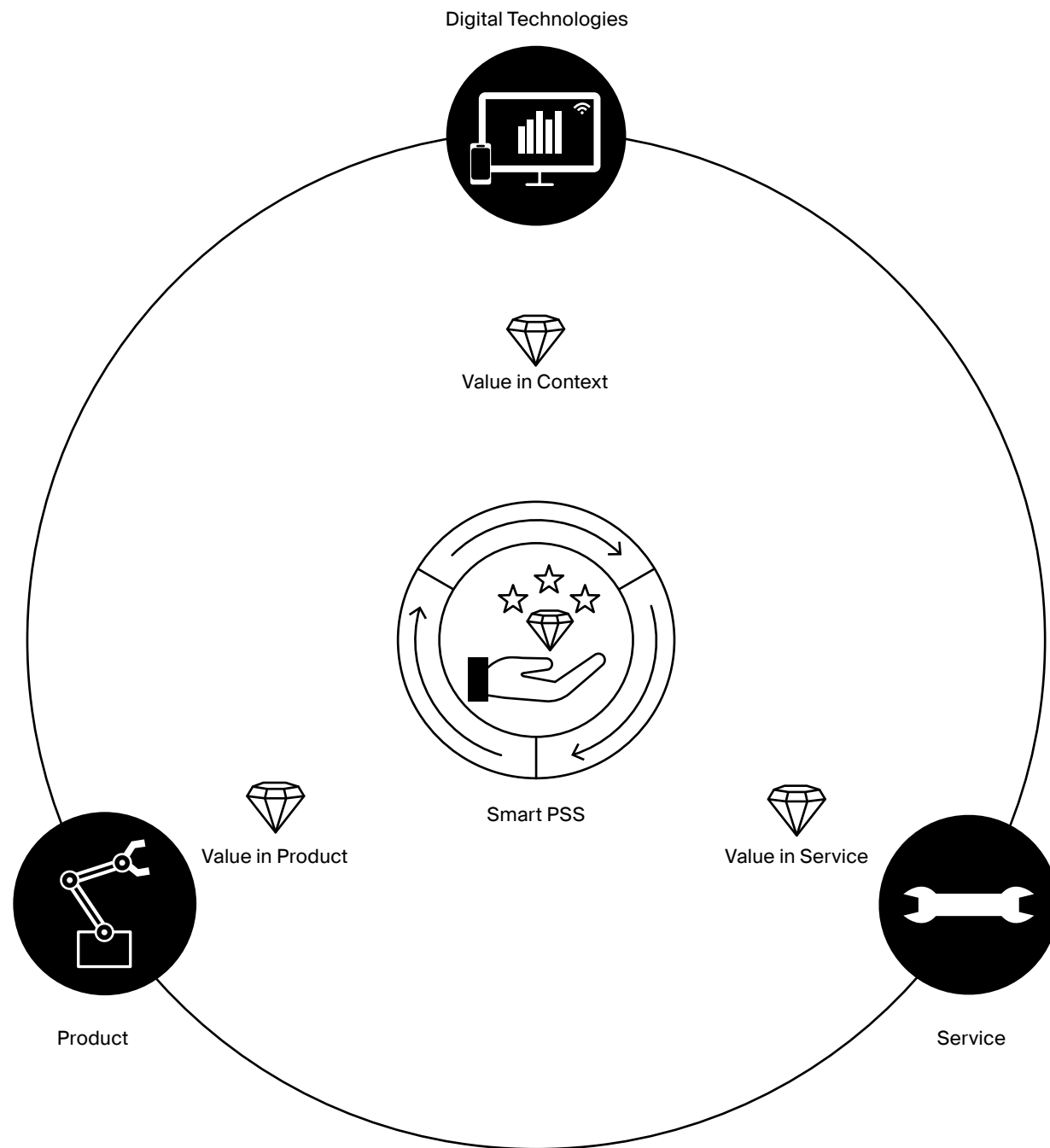
02. Structured milestones: Instead of following discrete, complicated steps you should focus on achieving specific deliverables—predefined milestones with tangible outcomes that signify the completion of key stages. One example of a deliverable is a business case that includes a risk assessment and an overview of costs and revenues. After each deliverable is achieved, a brief discussion

should be held with relevant stakeholders to validate the results and make informed decisions about the next steps.

03. Individual synchros: Harmonization efforts may include opportunities for informal chats between colleagues in the same team or across different departments. Harmonization can also take place through individual exchanges between individuals; for example, a software architect may chat with a colleague who is responsible for coding data interfaces and knows the current development status of a robot. Creating opportunities and formats for such exchanges is a crucial prerequisite for subsequent steps.

04. Customer-centric approach: Keep your customer at the heart of the innovation process. Continuously engaging customers using customer-centered methods, such as customer journey workshops, can help you ensure that their needs and preferences shape the direction of smart PSS development. This ongoing dialogue with customers will allow you to tailor the company's offerings precisely to customers' requirements.





INTEGRATE VALUE-ADDED UNDERSTANDING: GAIN INSIGHTS INTO SMART PSS COMPONENTS

As you embark on the exciting journey of developing a smart PSS, it is vital to understand the core components of innovation. Think of a smart PSS as incorporating a powerful trio of product, service, and digital technology components that work harmoniously to bring remarkable value to your business and your customers. We will now dive into these three smart PSS.

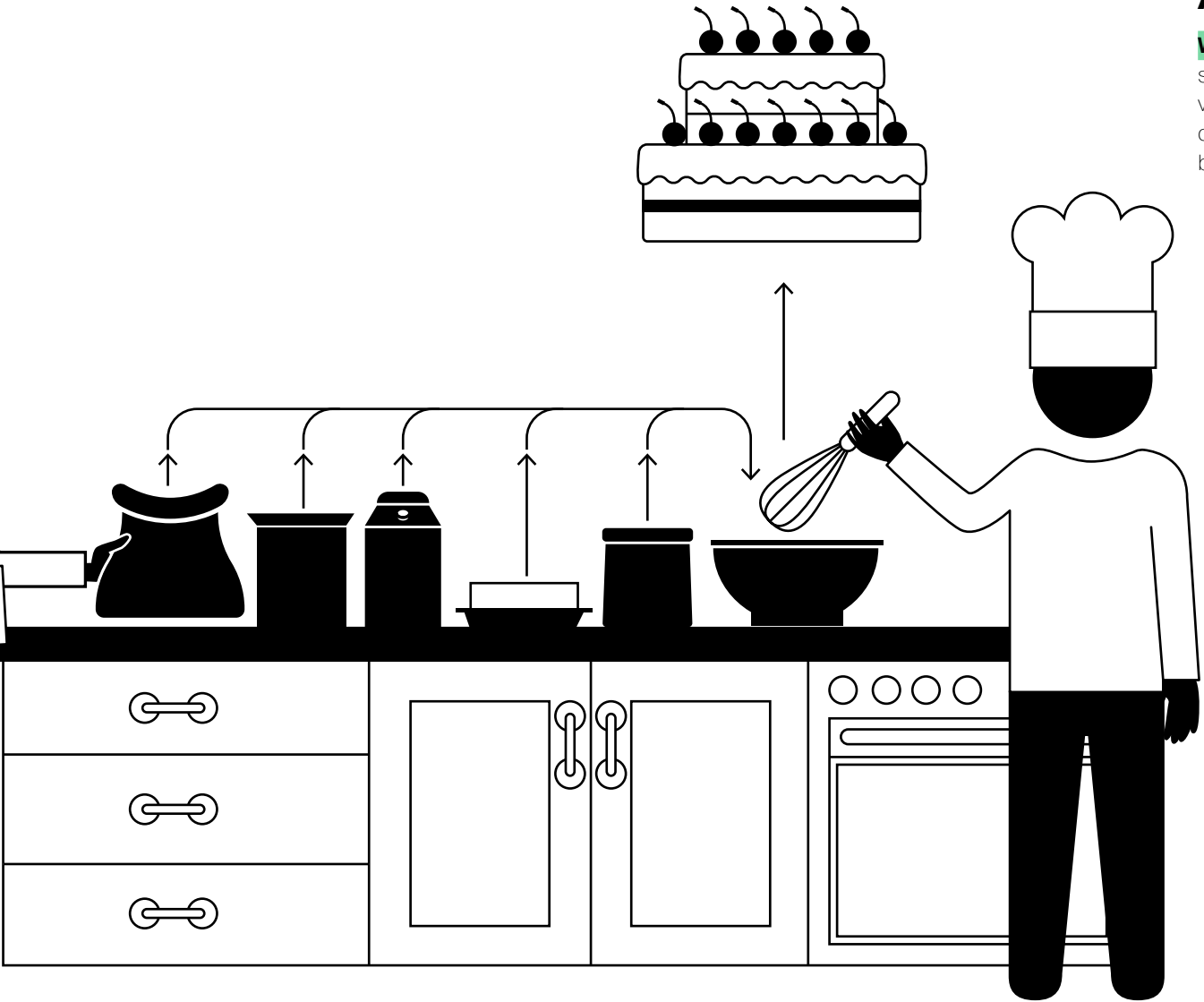
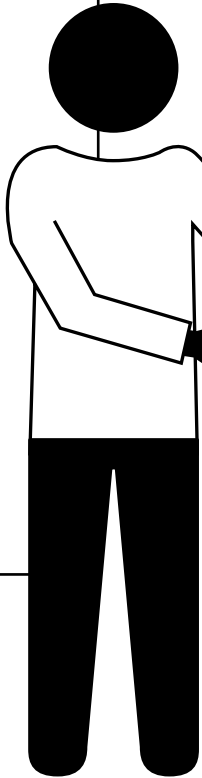
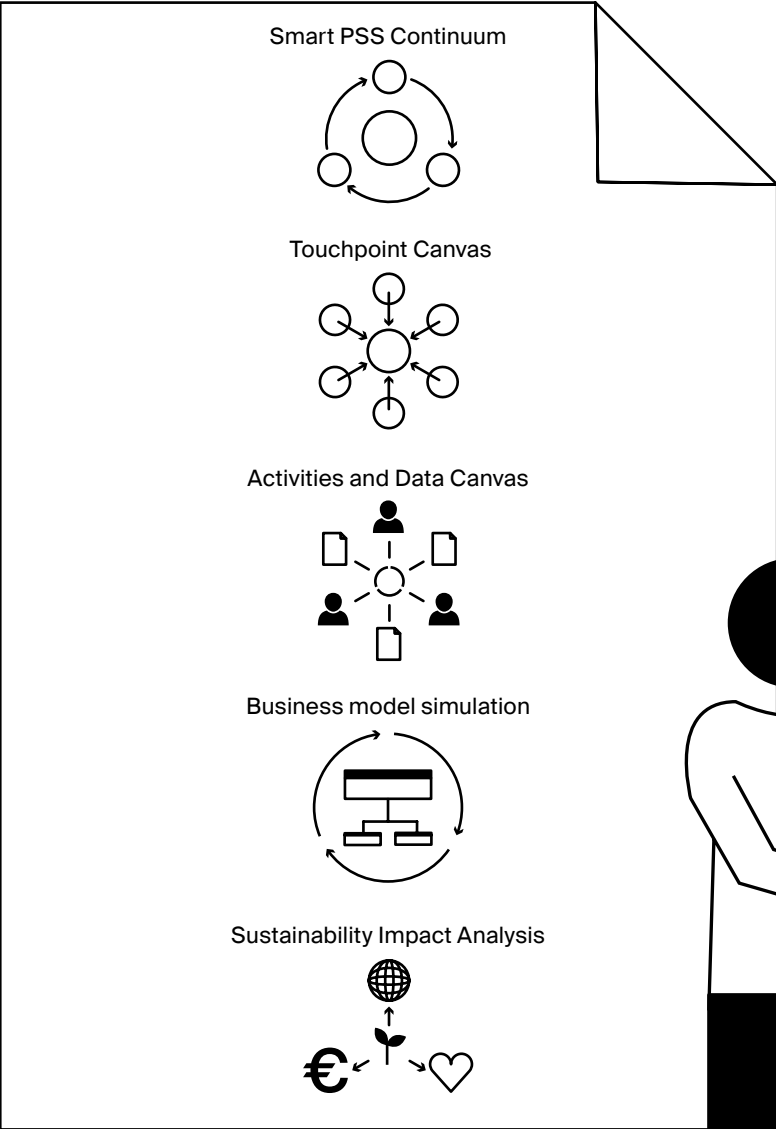
01. Product component: Imagine the product as the anchor that forms the foundation of your smart PSS. A PSS is not just a machine; it is a bridge between the physical and digital worlds. Smart PSS are not mere items—they are versatile tools designed to accomplish specific tasks. For instance, consider a robot seamlessly managing assembly in an industrial setting or a washing machine completing your laundry. Beyond their obvious functions, such products can replace human labor, delivering services such as refrigeration, dishwashing, or laundry. Many products are equipped with digital technologies, such as sensors, that elevate their capabilities.

02. Service component: Your offering goes beyond the product itself. When you sell a robot, you also provide valuable services, such as repair and maintenance. These services enhance the worth of your product and create a comprehensive solution for the customer. Think of services as intangible enhancements that optimize your products, prolonging their performance and life cycles. Such enhancements can range from maintenance and upgrades bundled with the sale of a robot to providing a personalized value proposition tailored to individual needs. Enhanced services enable customers to enjoy the benefits of products without the difficulties of ownership. Additionally, they foster interactions and relationships, offering personalized experiences and added layers of value.

03. Digital technologies: The magic of digitalization unfolds through digital technologies. Your products and services are elevated by digital technologies, such as sensors on a robot, which are designed to gather data about performance and usage and provide a wellspring of insights to enhance your services. A robot need not simply perform tasks; it can also collect data about its usage, performance, and maintenance needs. This information empowers you to design custom maintenance plans, extend the robot's efficiency, and offer predictive maintenance that addresses problems before they escalate.

In essence, the integration of products, services, and digital technologies shapes the value you provide and receive. The connectivity between physical items and data, the customization of services, and the insights from digital technologies together enable you to craft meaningful experiences for customers.

As you navigate the landscape of smart PSS development, remember the potential these components hold to revolutionize your business. The interplay between the tangible and intangible, the physical and the digital, is what makes smart PSS truly remarkable. With these foundational building blocks at your disposal, you are equipped to explore the endless possibilities of smart PSS and their transformative impact on businesses.



**SUPPORTING HARMONIZATION BY
APPLYING INNOVATION METHODS**

When it comes to developing smart PSS, SMEs often find themselves in uncharted territory. The lack of proven methods for developing smart PSS, particularly in determining the value they can bring, can lead to a sense of uncertainty as companies embark on the journey to becoming smart PSS providers.



The following sections provide a peek into the practical toolbox that you can find at www.smarthapsss.de:

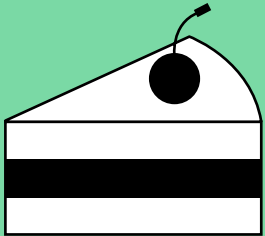
01. Smart PSS continuum: The smart PSS continuum provides a visual framework for classifying and discussing the different value-added components and priorities of smart PSS through products, services, and digital technologies. It provides stakeholders with transparency regarding different perspectives on the value of a smart PSS and provides a basis for consensus. It also helps organizations identify relevant roles and associated activities and needs in their innovation processes. The smart PSS continuum can be used as a strategic management tool to indicate future innovation directions and determine whether a stronger focus on services is necessary for realizing a smart PSS. The smart PSS continuum can also be used to map out the steps necessary to transform a company from a pure product provider into a smart PSS provider, and it can depict the necessary steps for digitizing a product into an intelligent product to increase the value of digital technologies in a smart PSS. In addition, the smart PSS continuum can be used as a tool to reflect on and describe completed innovation steps, such as transformation decisions, and to underpin learning for future development steps.

02. Touchpoint Canvas: Relevant actors and stakeholders can be identified using the Touchpoint Canvas, which provides a tool for mapping actors in ecosystems. The Touchpoint Canvas is used to visualize the phases, as well as the milestones and activities, of an innovation process and to analyze the involvement of each actor or stakeholder. This is done by listing the activities of each actor for each phase of the process as well as the methods to be used. This makes it possible to identify key players and decision-makers who can orchestrate the innovation process. Furthermore, a subsequent comparison of the target system

with the current system can provide suitable integration options for missing elements.

03. Activities and Data Canvas: The Activities and Data Canvas allows actors and stakeholders to share information about the development process and the data needed. Smart PSS development often leverages existing IT infrastructure; thus, to avoid data redundancy and/or the use of outdated data, it is important to align planned process activities, including the required data, with existing resources. The Activity and Data Canvas supports this by strategically aligning the planned process activities, the actors involved, the required data, and the respective data carriers. By comparing target and actual architectures and data, activity conflicts can be identified and either avoided or resolved.

04. Business model simulation: To better evaluate the different development options for a smart PSS, a digital model for the development and simulation of intelligent business models in the smart PSS domain was designed. The digital model is able to make the costs and benefits of economic, ecological, and operationalizable social aspects visible and tangible. The simulation function can be linked to companies' existing BPMN process models to enable managers without IT knowledge to use the simulation tool. The focus is on integrating into existing innovation processes, as well as providing barrier-free access to and promotion of new business models. The simulation is based on a simple business model with the aim of better estimating the development costs and the quantifiable and operationalizable ecological, economic, and social benefits of an innovative business model. The simulation was developed as a web service to ensure accessibility and low-threshold usability. By simulating smart PSS business models, SMEs can save resources and better control financial expenditures. Other benefits include the optimization of service processes, improved knowledge of assets, and increased quality of offerings. However, in addition to these benefits and opportunities, the risks associated with business model simulation must also be considered. For example, companies may receive a negative result from the simulation, perhaps due to incorrect basic assumptions, and therefore reject innovation.



05. Sustainability impact analysis: For a comprehensive sustainability impact analysis, a morphological box is a useful tool for breaking down impact pathways into three phases.

The design phase is the phase in which innovation actors define a smart PSS business model's characteristics.

The causation phase is the phase in which the mechanisms resulting from the design are identified.

The impact phase is the phase in which actual sustainability effects unfold.

This type of sustainability impact analysis visually lays out the opportunities for a design and the associated causations and impacts. Understanding these multicausal pathways early on helps in identifying and mitigating potential negative impacts.

Remember, the design of an innovation process shapes its outcomes. For instance, if your smart PSS innovation focuses solely on boosting product sales without considering life-cycle costs, you might overlook factors like modularity or repairability, which could negatively affect the environment by increasing resource consumption.

By employing a morphological box, you can empower innovation actors to craft multicausal impact pathways unique to your smart PSS innovation, in turn enabling you to mitigate unintended negative effects and activate the mechanisms that drive the desired sustainability outcomes.

With these practical tools at your disposal, you will be equipped to navigate the complex path of smart PSS development, whether you are focusing on value creation, sustainability, or innovation.

ADDITIONAL RECOMMENDATIONS:

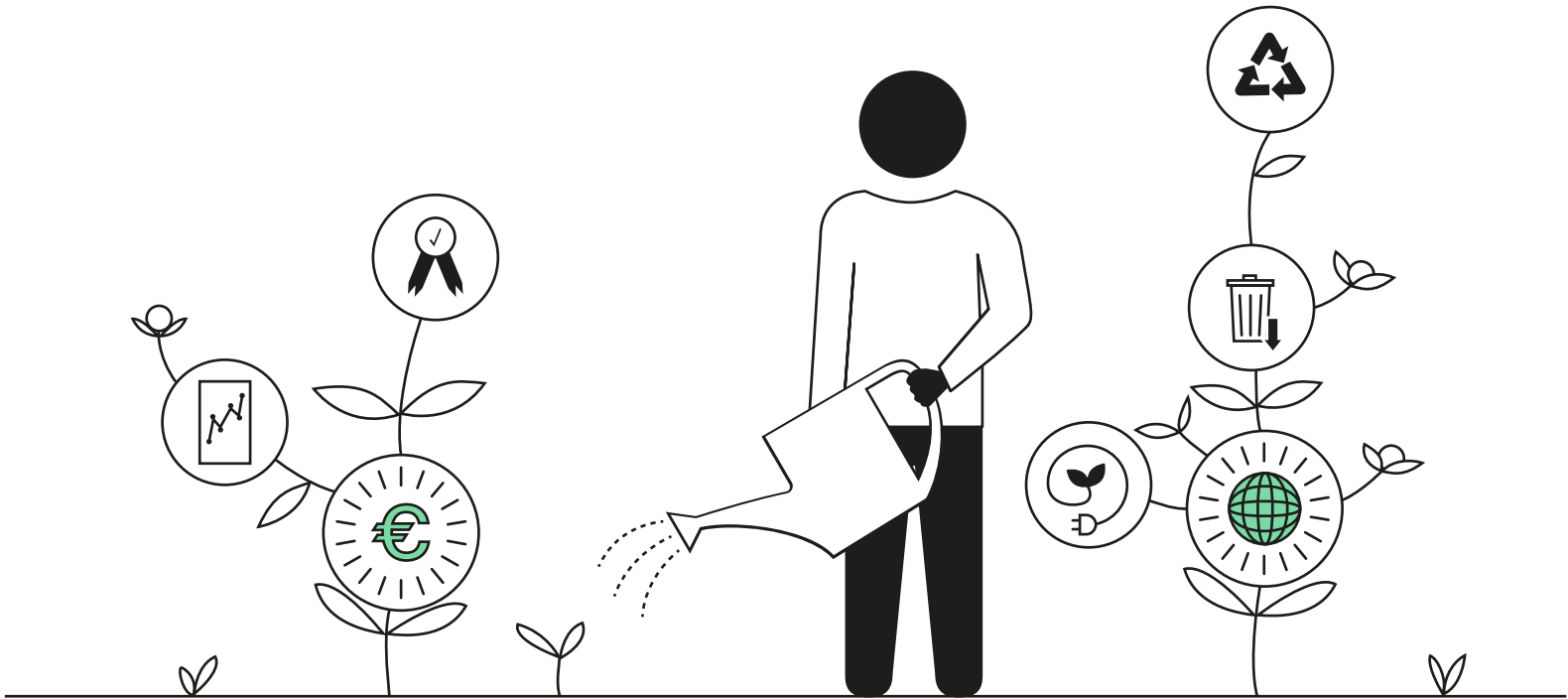
MORE TO CONSIDER

Sustainability

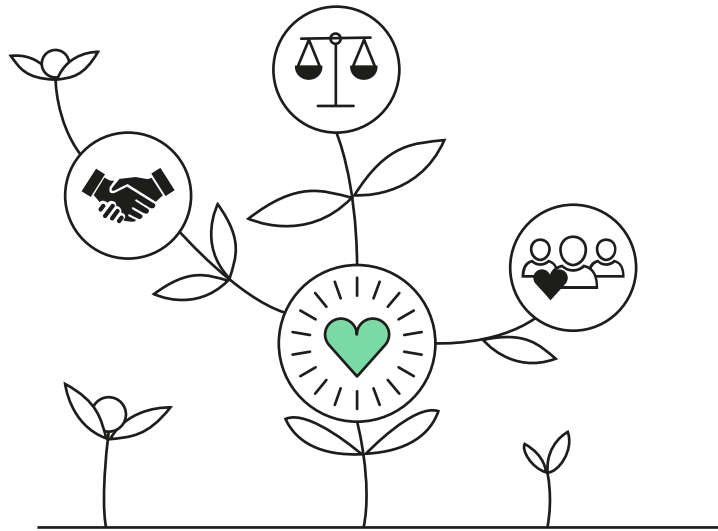
When it comes to developing a smart PSS, sustainability is a vital factor that can shape your journey and positively impact your business. By integrating sustainability principles, your smart PSS can contribute to a more responsible corporate stance, reduce your environmental footprint, and drive positive change across the board.

Incorporating sustainability into your smart PSS development journey means striving to create value both for your business and for multiple stakeholders, from customers and employees to suppliers, the environment, and the wider society. This means meeting today's needs while ensuring a sustainable future with minimal negative impacts across economic, environmental, and social dimensions.

01. Economic Impact: Sustainability affects various elements of a business, including costs, profits, quality, customer relationships, and collaboration. By adopting a sustainable approach to smart PSS development, you can better respond to customer needs and create a harmonized network of actors and stakeholders, who can then share resources and risks.



02. Ecological Impact: Your smart PSS ecological impact encompasses resource consumption, emissions, pollutants, and waste. For instance, ensuring the energy efficiency of digital technologies during their use and promoting reuse and recycling after a product's life cycle ends can significantly reduce ecological footprints.



03. Social Impact: Social impacts include factors such as human rights, equality, working conditions, and product stewardship. Designing a sustainable smart PSS involves minimizing negative externalities for stakeholders by, for example, ensuring that robots do not completely replace human workers and thus eliminate jobs, but that physically intensive work is taken over by robots, with the humans taking on control, coordination, management and creative tasks instead. On the positive side, smart PSS can encourage more sustainable behaviors by offering digital guidance.

A sustainability manager should drive sustainability, provide a pivotal link between smart PSS development and life-cycle management, and adapt processes to align with economic, ecological, and social sustainability goals. Additionally, employees can go above and beyond their roles by adopting a "sustainable working" mindset that can spur the creation of sustainable products, services, and processes. This mindset can catalyze smart PSS innovation and enhance awareness of sustainability aspects.

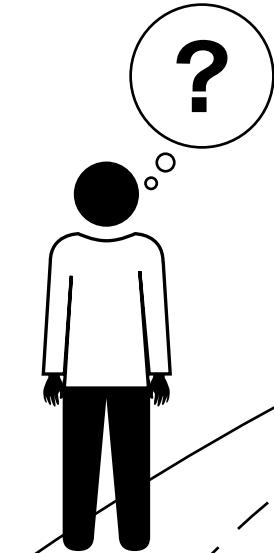
Barriers

Developing such complex systems as PSS raises certain barriers that can affect all three components of smart PSS development.

Embracing the diversity of digital technologies can be both empowering and confusing for SMEs. The multitude of existing interfaces and systems creates barriers to integrating and sharing data because different platforms and systems often use different data formats, protocols, and standards. This can hinder seamless collaboration and data sharing across the various aspects of smart PSS development.

However, developing a smart PSS involves more than technology; it requires developers to comprehend and fulfill customers' needs to enhance their experiences. This ambition can be especially overwhelming for SMEs that experience resource constraints and lack direct customer communication.

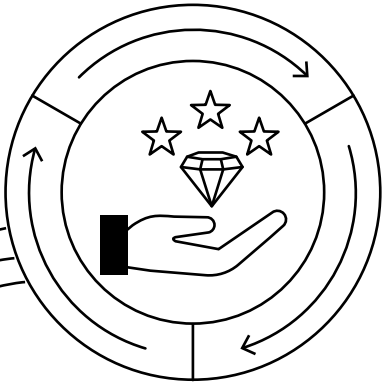
Failure to precisely recognize what customers desire is a primary example of a nontechnological barrier to smart PSS development. Customer preferences change over time and are influenced by trends, lifestyles, and technology, so it is important for smart PSS providers to maintain awareness of these changes to remain relevant. However, gaining this understanding requires extensive market research, data analysis, and surveys, which can be resource-intensive.



Customer pain points can also be barriers that need to be effectively addressed. This requires delving into the daily problems and difficulties customers face. Hidden customer issues usually require research and creative problem-solving strategies to reduce the barriers they create, which may mean teaming up with specialists or using established methods (for more information about our SmartHaPSSS method canvases, visit our website at www.smarthapsss.de).

If done correctly, addressing these pain points will provide value for smart PSS customers in terms of ongoing dedication. It takes constant innovation to compete in the market and please customers, but figuring out the cost-effectiveness of new features and services is tough and requires knowledge of how much customers are willing to pay for them. Business model simulations are useful tools for dealing with this issue. Our website provides one free of charge.

The following sections offer some practical insights that may help SMEs overcome the previously mentioned barriers and pave the way for success.



01. Forge a common goal: Effective integration requires a shared objective to match the product, service, and digital technology development expectations and demands. Such a collective goal can serve as a principle to guide cohesive smart PSS innovation, guaranteeing that every actor and stakeholder is aligned and working toward a common vision.

02. Systematically engage actors and stakeholders: Involve your actors and stakeholders systematically in the innovation process and benefit from their insights. Timely engagement is crucial. The key actors you have identified can support this and organize regular meetings, workshops, and other forms of collaboration, enabling you to tap into diverse expertise. Streamline their involvement to avoid misunderstandings and prioritize every essential perspective and need. Remember that your customers can also be important stakeholders.

03. Coordination is key: Keeping everyone involved and on the same track is very important. You can maintain alignment across all development fronts through consistent meetings, status updates, and well-established project management processes. Clear communication and transparent information flows function as shields against potential missteps.

04. Master interfaces to minimize redundancy: Identifying and planning interfaces between systems and platforms is crucial to ensure that redundant or incorrect data do not “slip through the cracks.” Make sure you review the compatibility of interfaces and aim for smooth interoperability. You may need to develop standardized interfaces to simplify data exchanges across multiple development areas.

Integrating different digital technologies into a smart PSS offers multiple benefits. Combining physical products, services, and digital technologies allows you to create new business models, improve customer experiences, and generate new revenue streams. However, unlocking these benefits requires the strategic consideration of certain factors.

05. Lay a strong foundation: Start with a clear plan. Envision your smart PSS clearly and treat the integration of digital technologies as a strategic initiative. Perform thorough analyses of your business processes, available resources, and technological needs. This initial planning phase is important for identifying possible obstacles and risks and addressing them directly.

06. Coordinate your team: Harmonization is essential. To integrate a smart PSS successfully, different teams and departments—and possibly external partners—need to work together. It is vital to ensure that all relevant parties are aligned and that clear communication channels are established. Regular meetings and status updates should be held to check progress and alignment, while helping to reduce conflicts and misunderstandings.

07. Bridge interface gaps: The coexistence of different digital technologies can lead to compatibility issues. Identify these discrepancies and develop strategies to overcome them. This may involve creating interfaces or deploying conversion tools to ensure smooth flows of data between the various elements of your smart PSS.

08. Look after your workforce: Bear in mind that integrating digital technologies can change work processes, required skills, and employees' roles. Train and support your team appropriately to help them navigate the new environment, and encourage open dialogue and employee involvement to ensure a successful transition and increased acceptance.

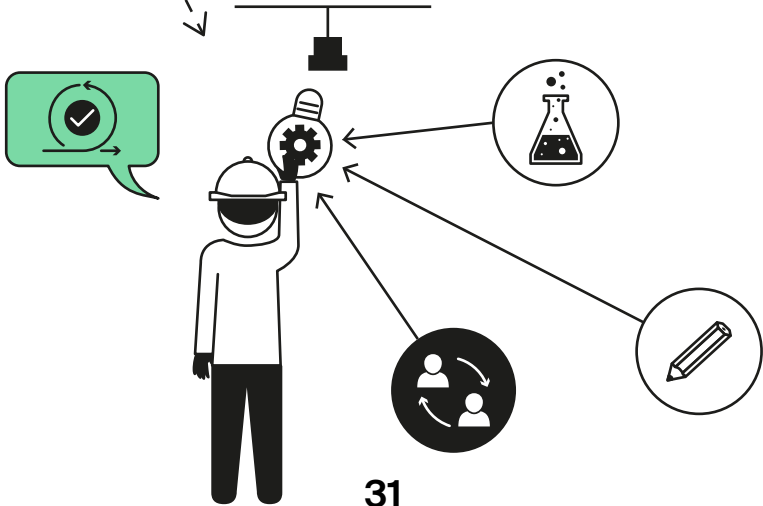
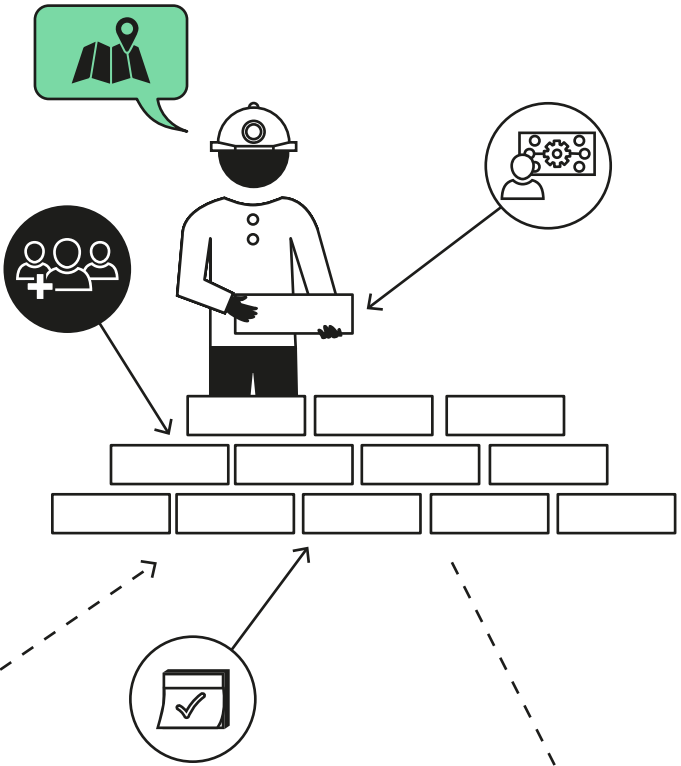
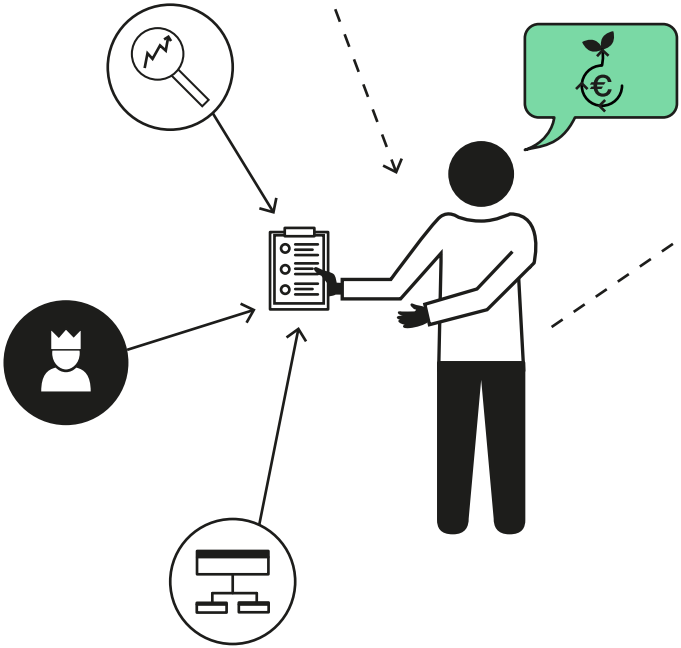
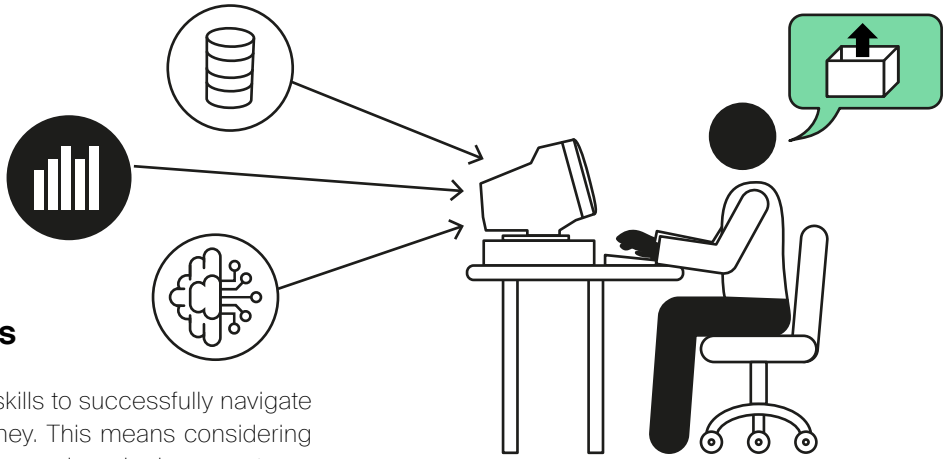
In conclusion, seamlessly integrating digital technologies into smart PSS requires a holistic and well-thought-out approach. This is not a one-time task, but an ongoing process. By devising a clear strategy, collaborating with your team, closing interface gaps, and supporting your staff, obstacles can be overcome and the potential of a well-integrated smart PSS can be fully leveraged.

Skills and Competences

Your organization needs specific skills to successfully navigate the smart PSS development journey. This means considering organizational and strategic factors and equipping your team with the right competencies. Smart PSS development requires a wide range of competencies in different areas, all aimed at harmonizing product, service, and digital technology development. The following sections present some key competencies that are essential for successful smart PSS development.

01. Data skills needed: Developing a smart PSS means immersing oneself in digital technologies and developing a strong understanding of data analytics, including the collection, organization, and extraction of valuable insights from large datasets. Familiarity with analytical techniques, such as machine learning, artificial intelligence, and data mining, is critical. These skills can enable you to employ customer and user data to tailor products and services and continually improve your offerings.

02. Strategic change: Creating a smart PSS requires a strategic shift and a rethink of your business model, which means identifying and creating new business models that seamlessly integrate smart products and services. This requires a deep understanding of customer needs and market potential as well as the ability to design models that can enrich the customer experience and create sustainable revenue streams and competitive advantage. Tools such as the Business Model Canvas and the Smart PSS Value Proposition Canvas can guide you through this transformation.



03. Organizational change: Implementing smart PSS requires organizational and structural changes. Your organization's internal operations, processes and structures need to adapt to effectively embrace smart PSS. Developing a visionary plan that outlines goals, resources, and timelines for transitioning to a smart PSS provider is critical. You may even need new teams dedicated to smart PSS and internal training programs to prepare your workforce for the changes. Successful organizational change depends on clear communication, employee involvement, and fostering a supportive atmosphere for change.

04. Mindset shift: Smart PSS development thrives when supported by an innovative culture and mindset. Creating an environment that is open to change, experimentation, and learning from failure is key. Encouraging your team to think outside the box, take calculated risks, and devise innovative solutions is essential. Facilitate creativity and collaboration through knowledge-sharing platforms and tools. An agile workplace in which people take ownership of and actively participate in the innovation process is the backbone of smart PSS success.

By honing these competencies and weaving them into your business strategy, your organization can equip itself with the skills needed for successful smart PSS development. Remember, these competencies are not isolated islands; they are interconnected and should be nurtured using a holistic approach to pave the way for good smart PSS implementation.

Company Examples of Smart PSS Implementation

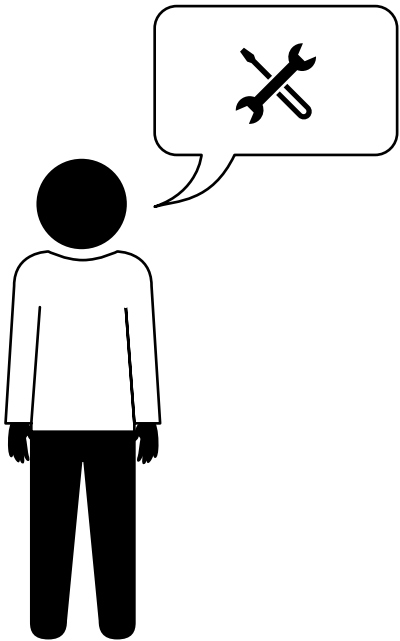
01. uvex: In today's ever-evolving work environment, ensuring the safety and well-being of employees is of paramount importance. This was realized by uvex, a corporate partner in the SmartHaPSSS project. Thus, the development of a pilot platform that would provide holistic safety services for employees with uvex products was developed—the PPE Manager.

Personal protective equipment (PPE) plays a crucial role in safeguarding workers from the potential hazards and risks associated with various workplace activities. However, selecting the right PPE for specific needs and situations can often be a daunting task.

To address this challenge, the innovative PPE Manager tool empowers customers to accurately identify their individual PPE requirements. A central feature of the tool is the seamless connection between danger or risk assessment and the characteristics of the PPE. Risk assessment is a process used to identify potential dangers, risks, and stress factors in work environments and situations. It allows organizations to pinpoint health and safety risks and develop effective countermeasures. Traditionally, PPE has been a common countermeasure for mitigating workplace hazards. However, the challenge lies in determining the specific type of PPE required for a particular situation, and risk assessments may not always provide this information. PPE Manager bridges this gap by swiftly and accurately identifying suitable PPE for individual needs and specific situations.

PPE Manager is a platform-based smart PSS that enables uvex to develop new digital products and services for the occupational safety of the future. The platform creates a software- and hardware-based link with PPE and thus enables holistic consideration

of PPE for PPE products. For this purpose, PPE Manager is used to determine users' specific PPE needs, accounting for possible returns. In addition, it enables new business models to be developed within the framework, and new forms of cooperation between suppliers, customers, users, and other partners to be established.



02. Intershop: Intershop refined the company's concept of a "personalized, adaptive search" using an innovative approach based on cutting-edge search and recommendation technology that draws on a wide range of internal and external data sources. The aim was to anticipate the products a visitor to an industrial online store might need and to present those items in personalized, finely-tuned lists, with recommendations, on the site.

The technology works seamlessly according to an API-centric architecture that interacts seamlessly with different IT tools and data sources. This allows device and real-time data to be fused into comprehensive 360° customer profiles hosted on a customer data platform. The beauty of this system lies in its adaptability, ensuring that customers' evolving needs are met.

At its core, collaboration with Intershop has demonstrated how the combination of cutting-edge technology and insights from multiple domains can lead to novel, impactful solutions. This journey has not only deepened current understanding, but also ignited possibilities for future breakthroughs in the ever-evolving landscape of machine learning.

03. REHAU: In the midst of our project efforts, REHAU came up with an ingenious creation—the KBox. This self-service marvel delivers essential PPE, such as work gloves, to factory workers. However, unlike a simple vending machine, it is equipped with a payment system. This innovative creation streamlines access to vital safety equipment on the factory floor.

Amazingly, the KBox tailors its offerings to each employee's needs, ensuring that the right products are readily available. Even more impressively, this smart machine can autonomously use sensors to detect when items are running low and trigger automatic replenishment. This dynamic system leads to smart planning and provision of safety equipment, saving costs, conserving resources, and increasing overall factory safety.

The collaboration with REHAU also set the stage for Project XR—an exciting venture that combines the power of virtual and augmented reality (VR/AR) with PLC technology to create a smart PSS. In the first phase, a prototype for training and guiding service technicians on complex machines in the factory was developed. This immersive training solution promises to streamline skill development and increase operational efficiency, taking us into a smarter future.

ADDITIONAL INFORMATION


About the Project

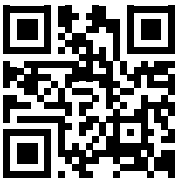
The findings presented in this booklet resulted from the research project "SmartHaPSSS". The akronym, which stands for "harmonization of the development of complex product smart service systems at SMEs", pursues the goal of identifying ways to support companies in becoming smart PSS.

As mentioned, this takes place through harmonizing individual activities in the complicated process of creating smart PSS and ensuring seamless coordination between the development of physical products, digital technologies, services and business models.

The "SmartHaPSSS" project addresses the dynamics arising from the increasing spread and use of the Internet in linking products, processes, and services.

More about the project:





www.smarthapsss.de

The Project Team



The multidisciplinary project team of SmartHaPSS

FAU: Prof. Dr. Angela Roth, Layla Hajjam, Spyridon Georg Koustas, Julian Kurtz, Nina Lugmair, Prof. Dr. Markus Beckmann, Julia Gebert, Lena Ries

uvex: Dr. Thomas Fröhlich, Marcel Olivier v. Beaulieu Marconnay

Leipzig University: Dr. Christian Zinke-Wehlmann, Sebastian Frericks, Andreas Kluge

Intershop: Dr- André Henning

REHAU: Dr. Edgar Quandt

Related Publications

⁰¹Kurtz, J., Meyer, P., Roth, A. (2022). Servitization in Germany – Establishing the context of servitization in manufacturing firms. 9th International Conference on Business Servitization: Servitization as a springboard for enhancing sustainable manufacturing (pp. 173-180). Omni-aScience. <https://doi.org/10.3926/serv2022>

⁰²Kurtz, J., Meyer, P., & Roth, A. (2023). Decoding the context of servitization: socio-technical pivots on the journey to service-oriented business models in manufacturing firms. Production Planning & Control, 1-18. <https://doi.org/10.1080/09537287.2023.2261880>

⁰³Kurtz, Julian; Zinke-Wehlmann, Christian; Lugmair, Nina; Schymanietz, Martin; Roth, Angela (2023): Characterising smart service systems – Revealing the smart value. In: SMR 7 (2), S. 112-128. <https://doi.org/10.5771/2511-8676-2023-2-112>

⁰⁴Lugmair, N., Ries, L., Schymanietz, M., Beckmann, M. & Roth, A. (2022). Making Sense of the Sustainable SPSS Value Proposition. ICIS 2022 Proceedings. 3. https://aisel.aisnet.org/icis2022/soc_impact_is/soc_impact_is/3/

⁰⁵Oks, S.J., Schymanietz, M., Jalowski, M., Posselt, T., Roth, A. (2022). Integrierte Entwicklung smarter Produkt-Service-Systeme. In: Bruhn, M., Hadwich, K. (eds) Smart Services. Forum Dienstleistungsmanagement. Springer Gabler, Wiesbaden. https://doi.org/10.1007/978-3-658-37344-3_10

⁰⁶Ries, L., Beckmann, M., & Wehnert, P. (2023). Sustainable smart product-service systems: a causal logic framework for impact design. Journal of Business Economics, 93, 667-706. <https://dx.doi.org/10.1007/s11573-023-01154-8>

⁰⁷Zinke-Wehlmann, C., Frericks, S., Kluge, A. (2021). Simulating Impact of Smart Product-Service Systems. 22nd IFIP WG 5.5 Working Conference on Virtual Enterprises (PRO-VE 2021), Saint-Etienne, France. 282-300. https://doi.org/10.1007/978-3-030-85969-5_26

⁰⁸Zinke-Wehlmann, C., Friedrich, J., Frericks, S., Kluge, A. (2023). Simulating the Enhanced Value-Capturing by Using Digitalization in Monetary and Non-monetary Collaborative Networks. In: Camarinha-Matos, L.M., Boucher, X., Ortiz, A. (eds) Collaborative Networks in Digitalization and Society 5.0. PRO-VE 2023. IFIP Advances in Information and Communication Technology, vol 688. Springer, Cham. https://doi.org/10.1007/978-3-031-42622-3_15

Imprint

Publisher
Hajjam et al. (2023),
Harmonizing Innovation Processes
in: Roth, A.; Möslin, K.M.; Pflaum, A. (Eds.):
Open Service Lab Notes, 7/2023

Editors
Prof. Dr. Angela Roth
Prof. Dr. Kathrin M. Möslin
Prof. Dr. Alexander Pflaum

Editorial Service
Timon Sengewald

Authors
Layla Hajjam
Spyridon Georg Koustas
Julian Kurtz
Nina Lugmair

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

Print
FLYERALARM GmbH

Design
Design von Leonie
Leonie Reimann
Hedehusene, Denmark

BMBF Reference Number
FKZ: 02K18D190.

The texts in this work are licensed under a Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0). It is attributed to the Chair of Information Systems I, Innovation and Value Creation at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU).





UNIVERSITÄT
LEIPZIG



InfAI®
Institut für Angewandte Informatik

uvex

intershop®



REHAU

Profile
Solutions

SPONSORED BY THE:



Federal Ministry
of Education
and Research

MANAGED BY:



PTKA

Project Management Agency Karlsruhe

Karlsruhe Institute of Technology

PUBLISHED BY:

