Co-funded by the
Erasmus+ Programme
of the European Union

NEW APPROACHES TO SME

INNOVATING DIGITALLY

SERVICE INNOVATION EDUCATION

Digital Innovation Whitepaper

Mapping of a Digital Innovation Process for Services based on Scientific Literature and Expert Interviews

FH MÜNSTER University of Applied Sciences
Uniwersytet Szczeciński
Amsterdam University of Applied Sciences
eucen
European E-Learning Institute
momentum [educate + innovate]

This publication has been funded with support from the European Commission within the Erasmus+ programme. This publication [communication] reflects the views only of the authors, and neither the Commission nor the Erasmus+ programme National Agency cannot be held responsible for any use, which may be made of the information contained therein.

Introduction

In the light of new trends such as **digitalization** and **servitization**, staying competitive proves to be a difficult task for many companies. Due to the challenges arising from changes in technology and customer behavior, **companies are asked to constantly innovate** (D'Emidio, Dorton, & Duncan, 2015). In this regard, servitization or service innovation has appeared as a successful way for many companies to overcome the dead-end road of competition (Bouwman & Fielt, Service Innovation and Business Models, 2008). As companies focus more and more on developing services, service innovation has started to gain increasing attention also in research causing the traditional product innovation view to shift towards **a multidimensional service innovation view** (see e.g., Carlborg, Kindström, & Kowalkowski, 2014; Biemans, Griffin, & Moenaert, 2015).

However, the development and designing of new services is **still little researched** and not a lot is known about the process (Bouwman, De Vos, & Haaker, 2008). The knowledge and understanding about how **digital technologies** are being strategic-ally used during the process of service innovation is even more limited (Akaka & Vargo, 2014).

9 months

30 mapped digital tools

25 innovation processes analyzed

26 expert interviews and surveys

The goal is to (1) shine light on the service innovation process and (2) to focus on how and which digital tools can facilitate the innovation process.

1 **We created a literature review on innovation processes and established our own literature-based digital innovation process model for services**

2 **We then carried out expert interviews and surveys to validate the process model**

3 **We mapped currently available digital tools on the market to our innovation process model and built a digital tools platform**

Definitions

A **common agreement on the definition of relevant terms** used during this project is necessary in order to create an aligned understanding when analyzing theories and studies on different innovation processes. The chosen definitions are based on various selected definitions found through-out academic literature fitting to the context of this project and **will act as a basis** for the development of the innovation model and the conducted interviews. The relevancy of the terms was derived from breaking down the term **‚digital innovation process for services‘** into its basic core terms. The following definitions were established:

INNOVATION is the production or adoption, assimilation, and exploit-ation of value-added novelty in outputs – such as products, services, and markets – which are implemented. It is both a process and an outcome.

The ***INNOVATION PROCESS*** is a nonlinear cycle of divergent and convergent activities that may repeat in unpredictable ways over time. It is highly iterative and organizations may enter the process at different stages and backtrack to earlier points but engaging in innovation follows a broadly agreed life cycle.

DIGITIZATION is the transformation from analog to digital data while ***DIGITALIZATION*** is the application of digital technologies to society.

DIGITAL INNOVATION is the use of digital technology during the process of innovating.

SERVITIZATION is the transform-ational process of shifting from a product-centric business model and logic to a service-centric approach.

SERVICE INNOVATION is the rebundling of diverse resources and change of roles and composition of the actor network involved in the value creation processes.

Based on these definitions and within the framework of this research, it shall be explored:

(1) how innovation processes are **specifically shaped** in different theories,

(2) which **specific characteristics** need to be added, changed, or removed to construct a **service innovation process**, and

(3) how **digital technologies and tools** can contribute to and be used during innovation.

Review Literature

The aim and output of this review on new digital innovation processes for services will provide an **analysis of the range of available literature**, existing academic and industry theories on innovation processes and innovation management – more specifically in the field of digitalization and servitization – and result in a **mapping of an up-to-date model of digital innovation process for services** based on 25 theories. The focus of the literature review is, consequently, how the process of service innovation is portrayed in renowned and current theories.

Outcome-view vs process-view

Regarding the phenomenon of digital innovation and service innovation, both can be viewed from **two perspectives - as an outcome and as a process**. While extant literature acknowledges the potential of the combination of servitization and digitalization (Ritter & Pedersen, 2020), most studies rather focus on the outcome than the process of innovation (Lusch & Nambisan, 2015; Häikiö & Koivumäki, 2016). Thus, they analyze digital innovation and service innovation only on a product- or service-level and consider the potential of digital technologies as part of service innovation rather than as facilitating the innovation process.

The **missing literature** to this regard and the **forced digitalization** due to the pandemic situation influencing companies' innovation process application has led this study to address the call for more extensive research on the process perspective of digital innovation and aim to fill the **identified research gap** of Nylen & Homlström (2015).

Furthermore, the **digital focus** of this study is on the supporting role of digital tools within a service innovation process to contribute to a digitally enabled service solution. The goal is to establish a way for service innovation process management to **evaluate and map currently available and future digital tools** on the market and use them in the right phases of the service innovation process.

The main aim and result of the literature review is a preliminary digital innovation process for services based on scientific literature.

As such, this study contributes to the process-centred literature on innovation which takes **digital tools as facilitating and enabling element** for service innovation development. Therefore, this study not only adds to the innovation process literature, but also to enabling businesses to better adapt to the new digital situation.

Consequently, the **analysis of different innovation processes will be the main focus** in the following chapters – accounting for digital- and service-specific elements. First insights regarding digital and service innovation from the process perspective include the generally broad life-cycle of sequence depending on the specific focus of innovation and context of occurrence, service innovation focusing on the front-end and customer-centricity of the process and digital innovation thereby facilitating service innovation through-out the front-end stages of innovation.

Methodology

LITERATURE RESEARCH
We conducted a literature search which yielded 242 results based on various search terms in the fields of innovation, digitalization and servitization

LITERATURE REVIEW
The results were analyzed regarding their relevancy and 25 scientific articles on innovation processes were identified

PROCESS MAPPING
One innovation process in particular was chosen as a baseline for comparison and the innovation processes were mapped against each other

PROCESS DEVELOPMENT
A three-level preliminary digital innovation process for services was developed based on the mapping results

Review

Literature

Table 1: An overview on the identified innovation processes

1. Digital Service Innovation Process (Häikiö & Koivumäki, 2016)
2. Process Theory of Innovation (Crossan & Apaydin, 2010)
3. Disruptive Innovation Process (Petzold, Landinez, & Baaken, 2019)
4. New Service Development Process (Zomerdijk & Voss, 2011)
5. Reverse Product Cycle (Barras, 1986)
6. Stage-Gate-Model (Cooper, 1990)
7. Product Development Funnel (Wheelwright & Clark, 1992)
8. Service Innovation Process (Thomke, 2003)
9. Design Thinking (Beckman & Barry, 2007)
10. Design Thinking-Based Innovation (Osorio, 2009)
11. Innovation Journey (Van de Ven, 2017)
12. Service Logic Value Generation Process (Grönroos & Gummerus, 2014)
13. Innovation Management Process (Alexandersdottir, 2015)
14. Iterative Stage-Gate Model (Cooper, 2014)
15. The Fuzzy Front End of Innovation (Herstatt & Verworn, 2001)
16. The Fuzzy Front End (Dornberger & Suvelza, 2012)
17. D4 Roadmap (Silverstein, Samuel, & DeCarlo, 2009)
18. Outcome-Driven Innovation (JTBD theory) (Ulwick & Osterwalder, 2016)
19. Innovation Life-Cycle (Tate, Bongiovanni, Kowalkiewicz & Twonson, 2018)
20. Digital Service Innovation Sprints (Tate et al., 2018)
21. Innovation Process for Services (Dörner, Gassmann & Gebauer, 2011)
22. Revised Theoretical Model for Service Innovation (Srivastava & Shainesh, 2015)
23. Public sector innovation process (Cinar, Trott, & Simms, 2019)
24. Overlapping Stage-Model (Jolly, 1997)
25. Search Model (Tidd & Bessant, 2020)

Overview of approaches collected

Based on academic literature, 25 approaches on innovation processes were identified. The focus during the research was on specific theories about the different stages and phases of an innovation process in order to identify a general digital innovation process for services applicable to the creation of service offerings by making use of digital tools. In table 1, a short overview on the identified innovation processes is given.

The summarized insights on the differences and similarities concerning the identified innovation processes are the following:

Most processes had a general or product innovation focus, only a few specialized on digital or service innovation

Some processes followed a linear structure

Some followed an iterative approach

Despite the structural differences in the innovation steps - most companies put explicit focus on the front end of the process

Review

To account for the details of service and digital innovation, these specific elements were highlighted throughout the process mapping. The result of the process mapping consists of a digital innovation process model for services. In total, six overall process steps were summarized on the first level (see figure below) which, in turn, contain 19 different detailed process steps on the second level.

Various exemplary concrete activities complete the third level to account for company context elements, especially the context of small and medium-sized enterprises. The first and main level of the digital innovation process for services goes as follows:

Literature

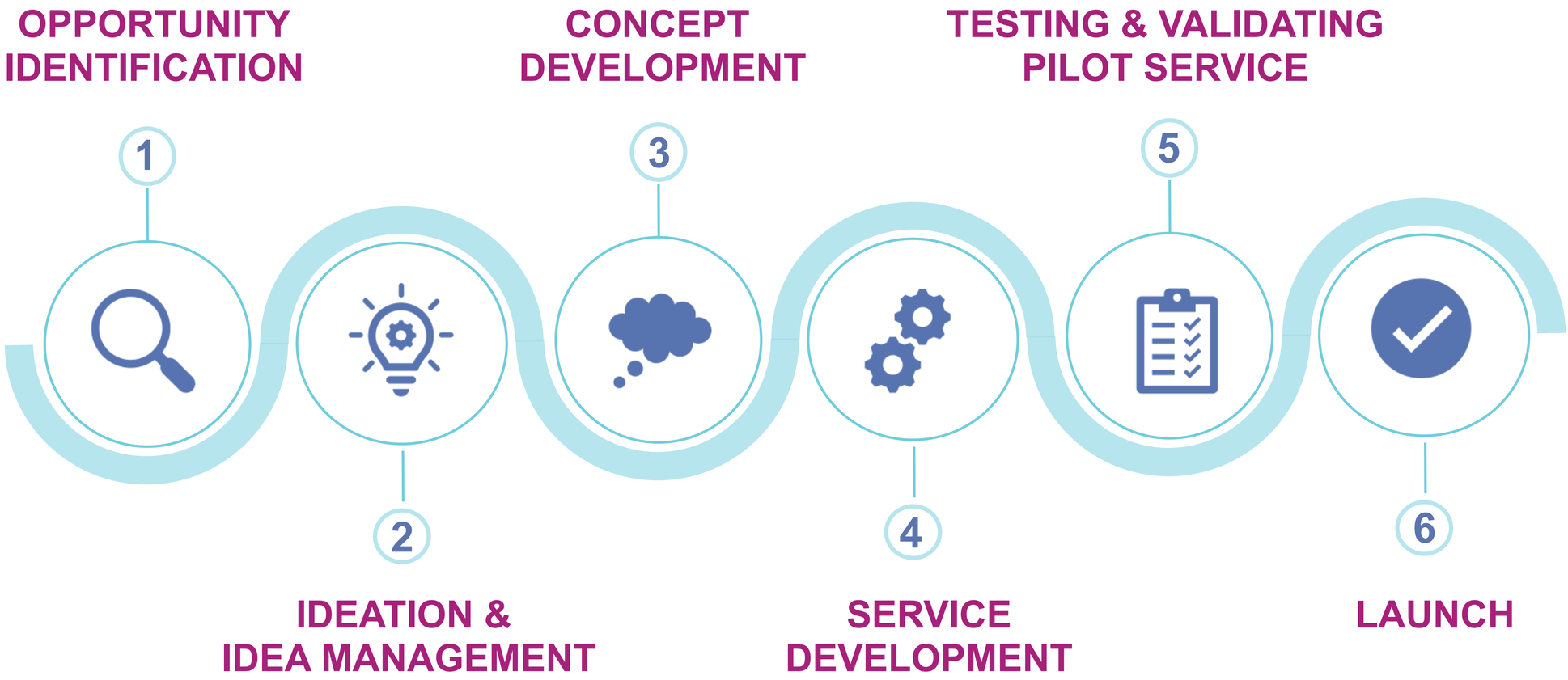


Figure 1: 1st Level stages of the Preliminary Digital Innovation Process for Services

The first process step is ***OPPORTUNITY IDENTIFICATION***. It consists of, firstly, gathering customer insights, then, identifying areas of opportunities from these insights and, lastly, identifying customer needs for services. Concrete activities, for instance, would involve conducting market research and customer interviews, studying new trends and technology, or observing customer and target groups. This step is necessary to understand and scope a problem based on the needs of customers and/or users.

The second process step ***IDEATION*** *and* ***IDEA MANAGEMENT***. During the process mapping, it became clear that the 'Ideation Phase' not only involves the creation of ideas, but the complete decision-making process involved. Therefore, the second process step entails, in detail, idea generation, idea scoping, idea assessment, and idea prioritizing and selection.

These steps comprise concrete activities from brainstorming, sketching out service blueprints over risk evaluation to ranking the ideas. The focus is not only on idea generation but puts equal emphasis on selecting the right idea that is based on the problem identified.

The next step that follows is ***CONCEPT DEVELOPMENT*** which includes detailed process steps such as concept generation, concept description, concept selection and concept testing. This process phase focuses on, among other activities, very detailed and advanced ideation with concepting activities, describing practical use cases, and creating first prototypes and first drafts of the idea that are tested with customers. During this phase, the idea is enhanced with more details and brought to life. Important aspects are concretized such as the value proposition.

Review

Literature

As the fourth process step, the ***SERVICE DEVELOPMENT*** phase takes place. Explicitly, process steps that are relevant for service innovation have been established which are the implementation of changes after having tested the concept, experimentation and/or simulation of the implemented ideas, the development of different service elements as well as the preparation for validation of the service innovation. In this process phase, implementation and integration activities such as software development would be a focus as well as design activities, many rounds of prototyping, and the development of a pilot service. Validation activities are prepared for the next stage such as planning usability tests.

The fifth stage is ***TESTING AND VALIDATING THE PILOT SERVICE.*** This includes the installment and deployment of developed services, setting up the pilot service, and testing and validating the pilot service. Overall, this phase is characterized by preparational activities for the pilot service, setting up a way to showcase the pilot service such as setting up a pilot store, and doing many different customer tests such as field tests, beta tests, or in-home use tests. All of these tests will be focused on acquiring direct feedback from first-time users or customers and gaining insights into their behavior.

The last stage is the ***LAUNCH*** of the service innovation which mainly focuses on commercialization. Commercialization would entail concrete activities such as implementing a market launch plan, generating first sales, and continuous verification of the solution.

All of these six phases are meant to follow an ***ITERATIVE APPROACH*** which allows to iterate within each phase but also between different phases. Therefore, during the many testing activities, for example, it is possible to gain significant insights which lead to having to backtrack in the process phases to redefine certain implications or make necessary changes to the idea or development.

This preliminary digital innovation process model for services is not to be understood as a fixed sequential model but allows for some stages to be skipped and for some to go in parallel to each other.

Preliminary Digital Innovation Process For Services

As the result of the literature review, a preliminary digital innovation process for services was constructed on three levels. A full overview of the three-level process with all synthesized insights from the 25 identified innovation processes can be seen in the following figure. While the first level refers to the overall steps as briefly described above, the second level presents a more detailed procedure of steps. Finally, the third level refers to specific tasks which are considered to be part of the respective process step.

1st → Overall process steps

2nd → More detailed procedure

3rd → Specific tasks within steps

1st	2nd Level	3rd Level
Opportunity Identification	1. Gathering customer insights	Market Research Customer Interviews Identifying nuggets and user stories Identifying dimensions of user behavior Creating timelines e.g. day-in-the-life timelines Gathering information about consumer's preferences e.g. in form of photos or videos
	2. Identifying areas of opportunity	Study new trends, approaches and technology Define innovation challenge Identify Job-to-Be-Done and outcomes for each job Desktop research Problem scoping
	3. Identifying needs for digital services	Fundamental research Observational or Ethnographic research Participant observation Non-Participant observation Separation of user experience into phases Testing initial assumptions Prepare preliminary roadmap for observation and interviewing
Ideation & Idea Management	4. Generating ideas	Generating ideas for products, services and environments Generating ideas with different perspectives e.g. customer-oriented, technology-oriented, cost-oriented Generating ideas using different methods e.g. brainstorming, customer journey, touchpoint approach, story telling, lead user method Questioning and challenging existing assumptions Explore solutions through various combinations and substitutions Identify new paradigms for potential solution generation Seek solutions from outside knowledge databases Apply solutions from nature's problem solving Include customers by letting them provide ideas interaction with service ecosystem actors
	5. Scoping ideas	Visualizing and detailed descriptions of ideas using sketches, service blueprints or customer journeys Stakeholder analysis Problem scoping and definition Determining customer demands using skills workshops, life cycle analyses or trend analyses Focus ideation efforts on specific performance metrics
	6. Assessing ideas	Determining implications of ideas (people, time, cost) Finding practical uses for ideas Assessment according to solving problems and needs of users/customers Assessment according to attractiveness, risk and alignment with existing projects Evaluate ideas against the same specific performance metrics to determine which ideas will get the job done
	7. Prioritizing & selecting Ideas	Sorting and prioritizing ideas Evaluating against outcome expectations Strengthen and shaping ideas

Continued on next page

Preliminary Digital Innovation Process For Services

1st	2nd Level	3rd Level
Concept Development	8. Generating concepts	Very detailed ideation with concepting activities More detailed research activities e.g. about customer behavior Soliciting feedback from potential users Logical or intuitive concept generation techniques e.g. morphological analysis, brainstorming, sketching or word association
	9. Describing concepts	Creating concept descriptions using use cases, blueprints or service process description Building use cases Formulate value proposition Discussion of background processes Build rollout plan
	10. Selecting Concepts	Selecting concepts based on decision tools and prioritization methods
	11. Testing concepts	Creating first prototype (first drafts of e.g. service user interface visualization) Determining learning goals Refining concept designs into many prototypes (products, services and process concepts) Validating prototype by testing concepts with handful of stakeholders and customers Acquiring feedback from users or customers (iteratively)
Service Development	12. Implementation of changes	Complete detailed design of new service Technical and system-based implementation or integration activities like software development Develop test plan (integrated rollout plan)
	13. Experimentation/Simulation of implemented ideas	Setting up pilot systems Prototyping Detailed tests Marketing and operation plans Including customers as co-creators and testers
	14. Development of different service elements	Finalizing service elements like user interface design Design of systems that allow and sustain new user experience Further rounds of prototyping and testing Pilot service development
	15. Preparation for validation	Planning of customer and user interviews Planning of usability tests Design reviews
Testing & Validating Pilot Service	16. Installation and deployment of services	Preparational activities for pilot service
	17. Setting up pilot service	Setting up a way to showcase pilot service e.g. a pilot store with service and tangible components of service solution
	18. Testing and validating	Doing customer tests: user or field trials (testing service under actual use conditions) Beta tests In-home tests Trial sell and usability tests Collecting data from customers and users: behavior or feedback Finalizing designs and service components
Launch	19. Commercialization	Implementation of market launch plan and operations plan Generating sales Continuous solution verification

Iteration
within stages and between stages possible

Figure 2: Three-level stages of the Preliminary Digital Innovation Process for Services

NEXT STEPS:

Conducting expert interviews
Validating preliminary digital innovation process for services
Finalising the process

Expert Interviews

After having analyzed scientific literature on innovation process theories and approaches to bring about a preliminary digital innovation process for services, expert interviews were conducted with lecturers of innovation-related courses in HEI. These were meant to enrich and finalize the preliminary model to combine theory with practice approaches.

Aim and content of the interviews

The aim of the interviews is the inclusion of the network of HE organizations to add to the theories and findings of the literature review with the final goal to construct a "final digital innovation process for services". By directly involving practicing educators in the research phase, authenticity of the results is ensured as well as invaluable insights gained. Put simply, the interviews aim to address the following four fundamental questions. These main questions were tackled with the help of a more detailed interview guideline.

1. **How does an up-to-date innovation process look like and how do educators teach innovation processes in HEI?**
2. **How does servitization, more specifically the innovation for services, influence innovation processes?**
3. **How does digitalization, more specifically digital tools, influence innovation processes?**
4. **Which challenges are currently faced in teaching innovation processes and how should these challenges be met?**

Methodology

INTERVIEW PREPARATION

Preparation of interview guidelines and accompanying documents to enable a consistent interview procedure for all participating researchers in the different countries

INTERVIEW CONDUCTION & DATA COLLECTION

In total, 26 interviews were conducted in 10 countries. The data was collected through participants' written or oral elaborations.

DATA ANALYSIS

The interview summaries were analyzed with the software MAXQDA to identify rich insights from the interviews.

26 expert answers

3 research strategies

9 diverse positions

10 different countries

Complex dimensions in teaching activities

Expert Interviews

INSIGHTS ON INNOVATION PROCESSES

Insight 1: The process starts with an initial step of understanding the problem. It is then followed by ideation, concepting and design, development, piloting ending with commercialization and scale-up.

The experts overall agreed on the general innovation process presented as the basic process by Häikio & Koivumäki (2016). However, two more steps - in the beginning and the end - were added to the original five.

Insight 2: Innovation processes can start in different steps of the original process.

Even though specific innovation steps were established by the experts in a specific order, experts also stated that the innovation process does not need to start with understanding the problem. Innovation can start at various points of the process steps.

Insight 3: Not all steps are covered in every innovation process.

It was clarified that innovation processes may include all identified process steps but don't necessarily have to in every case. Some innovation processes can be broader and include less steps than others.

Insight 4: Skipping steps is possible within an innovation process.

In addition to the starting point of innovation and the number of process steps, some steps within the innovation process can be skipped as well. It is not necessary to go through all the steps of the innovation process.

Insight 5: An innovation process can end in different steps of the process.

Just like an innovation process does not have to start at the first step, it does not have to end with the last identified step either. Innovation can therefore end at various points of the process and follow its own specific sequence of steps.

Insight 6: Project management, flexibility, and iteration are important characteristics of innovation processes.

While most innovation-related tasks can be assigned to specific steps within the process, there are some more general tasks which shall be summarized under *project management.* Despite the illustrated linearity of the innovation process steps, the innovation process is overall of a *flexible nature* as it can be adapted to a project's context. Adding to the flexibility insight, *iteration* is mentioned as a key component to the innovation process which leads to an iterative cycle. Iteration is possible on the process level as well as in-between specific process steps.

Expert Interviews

INSIGHTS ON DIGITAL INNOVATION

Understanding of digital innovation

Adding to the insights on the innovation process analysis, some digital innovation characteristics shall be outlined. According to the interviewed experts, digitalization…

- is an important and integral part of innovation
- is described as a catalyst or driver of innovation
- shall boost organizational and innovation programs and strategies and speed up processes
- is sometimes seen as a pre-requisite or an enabler in different process steps
- can cause a rearrangement of the whole innovation process
- of the innovation process can create increased effectiveness and efficiency

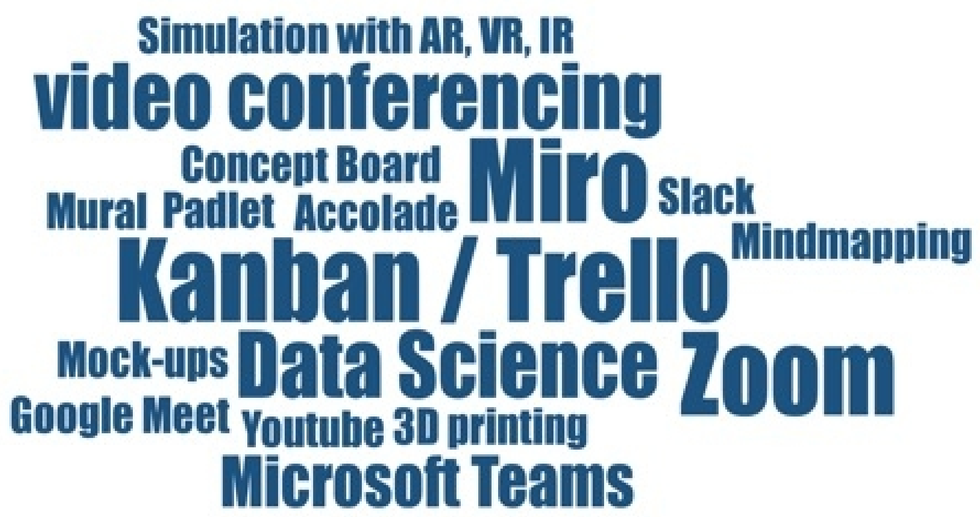
A specific focus should be laid on change management and training of the project team as well as the reconsideration or new project constellations due to the new possibilities offered by digital tools.

Facilitating digital tools

More specifically, experts were further asked to explain which digital tools can be used and how they can be used in the innovation process. This yielded very diverse results as visualized in the cloud of digital tool codes in the figure below.

Digital tools differ…

- in relation to the first level process steps
- in relation to their functionalities



It shall further be highlighted that…

- the main focus should be laid on how to integrate the tool to effectively use it
- some tools appear to be too complex in functionality and too expensive
- further criteria need to be derived in order to map digital tools to the innovation process

Capabilities for digital innovation

As the use of digital tools in an innovation process introduces changes to the procedure, it seems logical that specific capabilities are required to successfully go through this process.

The focus should be laid on:

- Technical capabilities
- Motivation and mindset
- Interaction capabilities
- Data management
- Process management capabilities

INSIGHTS ON SERVICE INNOVATION

Expert Interviews

Understanding of service innovation

After having gained some insights on digital innovation, we want to look deeper into service innovation from different perspectives. First, experts were asked to state their understanding and perception of service innovation, to identify process-specific characteristics. Interestingly, interview participants reported no major differences in innovation processes leading to service offerings. But, despite this first impression, certain differences were still mentioned redirecting the focus of the process.

At the core of services, there is customer-centricity.

There is a need for more knowledge about the target group to develop customer-oriented service offerings. Customer data or potential users shall be directly involved in the early stages as well as later stages. Focusing on people is at the center of innovation, while co-creation or co-design might involve more than just customers.

Customer-centricity and co-creation are also mirrored in the process perspective.

A major role is given to empathy to identify customer needs, while prototyping seems to be of less importance. Overall, service innovation processes appear to be shorter and not linear, faster with quick decision making, easier in terms of prototyping and more agile making iteration necessary.

Service innovation can take various forms of outputs.

Service innovation does not only observe the overall output to be a service offering instead of a product, but it is more specifically concerned with the different types of services, such has internal servicing of other departments or business functions as well as external services targeting customers. In this context, the same steps and data used in the innovation process might lead to different outputs.

Capabilities for service innovation

Considering capabilities for service innovation, rather similar capabilities to those for digital innovation can be observed.

Important capabilities are…

- Technical skills
- Understanding for service characteristics
- Understanding, application, and management of the process
- Enterprise, network development, and regional development capabilities
- Open mindset

Expert Interviews

INSIGHTS ON TEACHING PRACTICES AND CHALLENGES

While the outlined capabilities for digital innovation and service innovation as well as the insights on the innovation process in general facilitate the construction of an up-to-date HE course on digital innovation process for services, the current teaching practices and challenges shall also be analysed to complete the picture.

Therefore, some key characteristics of innovation process courses such as name, size, level, learning objectives and outcomes, teaching practices, and used theories shall be regarded. Furthermore, some challenges shall be observed.

Key elements

Size

The key element 'size' refers to the **number of students in one course**. It was found that courses tend to be of medium size with 50 up to 70 students or of a small size with less than 30 students. Some few courses were taught with over 70 students.

Level

The key element 'level' refers to the **level of education** at which these courses are taught. Most courses are taught by the interviewed experts are on a Bachelor level and only a few on a Master or even Doctoral level.

Learning Objectives

In terms of '**learning objectives and outcomes**', these followed three different fields - developing knowledge about theories, methods, and techniques, applying the innovation process or parts of it, and developing specific capabilities.

Practices

With regard to the course size, **specific teaching 'practices'** were also selected. While larger courses tend to be held in a lecture style, smaller courses are taking place in an interactive seminar format. Different teaching materials and means were found.

Used Theories

Higher Education lecturers make **use of a range of innovation theories and models** which are taught with a project- or problem-based learning approach or an active- and experience-based learning approach.

Expert Interviews

INSIGHTS ON TEACHING PRACTICES AND CHALLENGES

With regard to the different course categories, specific combinations of characteristics can be mapped. These are visualized in the following table:

Table 2: Key elements of teaching styles in innovation-related courses

Key Element	Managerial perspective courses	Technical perspective courses	Societal perspective courses
Size	Mostly <30 or 50 - < 70; few with 30 - <50 and 70 or more	Mostly <30 and 50 - < 70	Mostly larger courses with 50 or more
Level	Mostly bachelor followed by Master courses	Mostly bachelor followed by Master courses; only one post-graduate course	Mostly advanced level such as post-graduate courses
Learning	• Applying the innovation process • Developing wider knowledge and apply methods, theories, and techniques • Some, specifically about developing student skills	• Applying the innovation process • Developing wider knowledge and apply methods, theories, and techniques	• Applying the innovation process
Practices	Almost even distribution of interactive seminars and lecturers; especially use of didactics such as case studies, group work, and gamification elements	More lectures than interactive seminars; especially, use of didactics such as handbooks, case studies and group work	More courses are taught as interactive seminars than as lectures; no specific didactics could be identified
Used Theories	• Mostly use of well-known innovation process theories • Only rarely use of field- or organization-specific theories as well as diverse techniques and methods	• Mostly use of organization- or IT-specific theories • Only rarely use of well-known theories such as the Innovation Matrix by Pfeiffer	• Use of field or region-specific theories • Also use of a pragmatic approach focused on tools and techniques
Connection to	Major relations to technical courses	Major relations to managerial courses	Some relations to managerial courses

Challenges in teaching innovation processes

1. Challenges in teaching innovation processes lie within the studies of innovation processes themselves

Many experts claim that one of the biggest challenges is the *lack of teaching-related and innovation-related knowledge and skills*. These appear on both teachers' and students' side. While teachers' struggle with developing sufficient technical skills or updating their knowledge about innovation processes, the students face the challenge of developing a basic understanding for the scientific knowledge and identifying the connection to practice,

2. Challenges in teaching innovation processes are connected to the innovation process environment

Through the expert interviews it became clear that *external factors strongly influence creation of innovation courses*. These include e.g. the lack of time and financial resources of involved stakeholders to go through the innovation process or larger course sizes creating communication problems.

Final Digital Innovation Process For Services

Combining the insights of the literature review and the expert interviews, a final digital innovation process for services shall be constructed. Overall, this visualization shall not make the preliminary process redundant but **enrich it with specifics**.

Therefore, the aspects innovation process, digital innovation, and service innovation shall be addressed separately to i**ntroduce their role in the model**. Furthermore, their relation to each other will be highlighted.

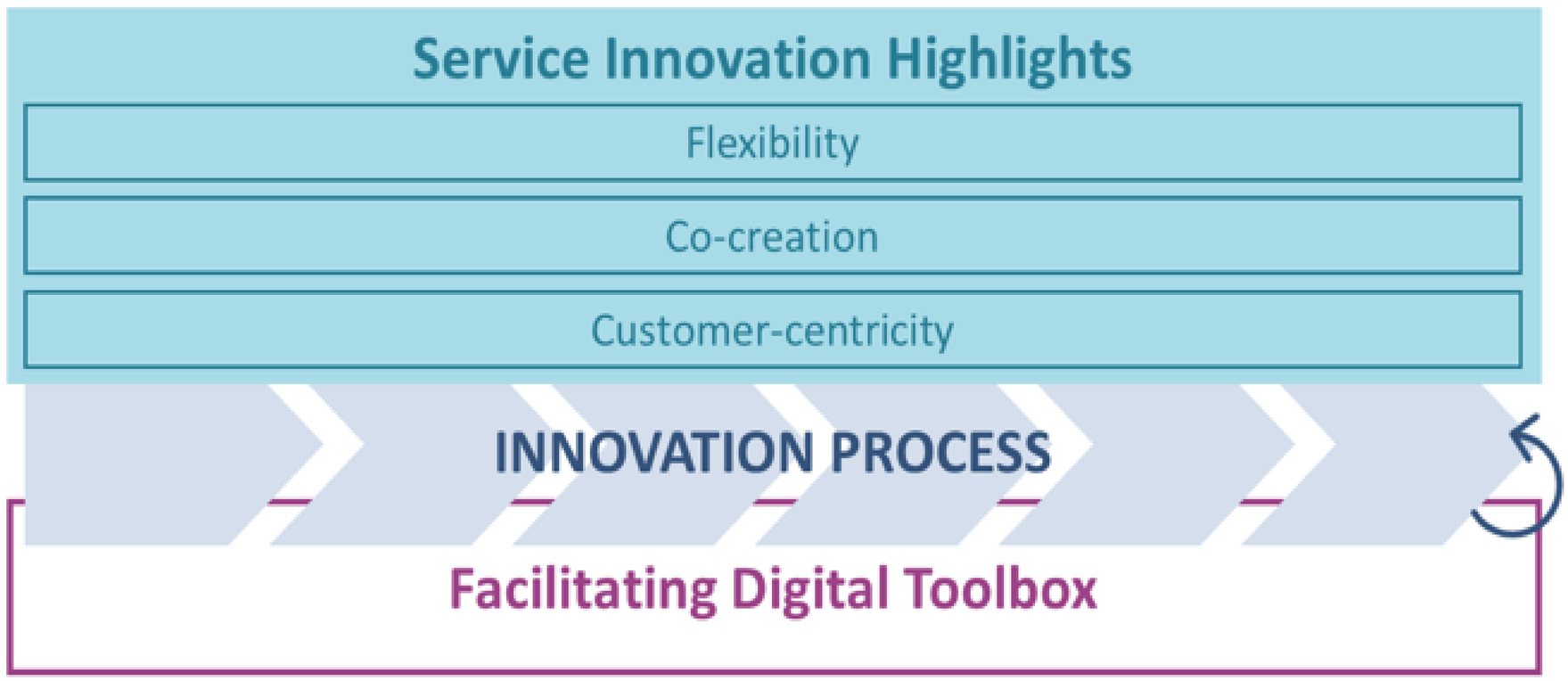


Figure 3: Final digital innovation process for services

At the centre of the layered model is the **three-level innovation process** as presented in the preliminary model. To simplify the visualization only a rough representation of the innovation process is shown. Nevertheless, it shall represent for the full three-layered innovation process as mapped earlier. Having been built on scientific literature, it also shows viability in expert interviews, thus, shall represent the basic innovation process in the final model.

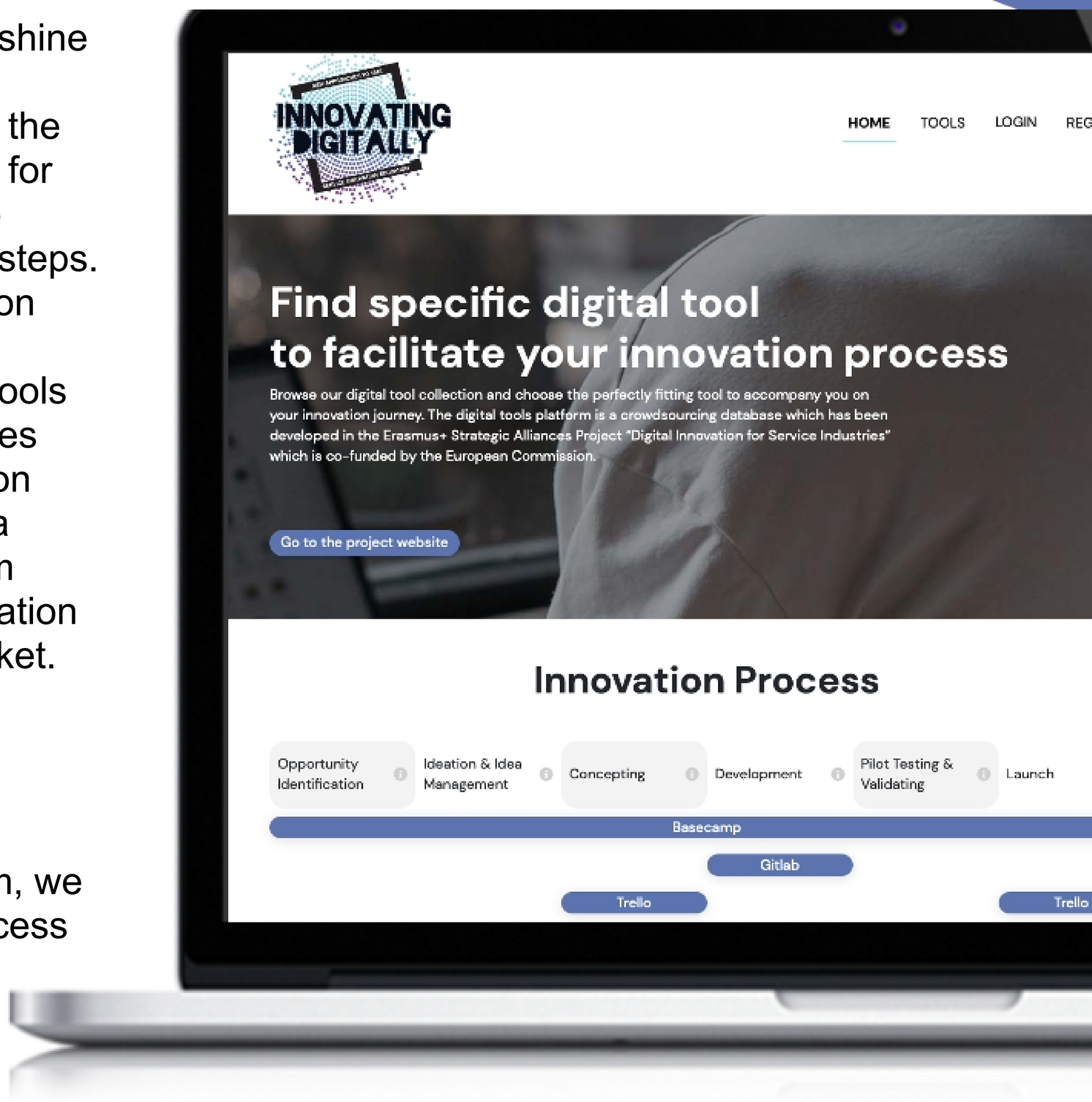
The foundation of this model is made of a **digital toolbox which takes the role of facilitating** the innovation process. On the basis of the expert interviews, digital tools were found to just have a supporting and facilitating role and should not be at the centre of attention. Furthermore, while digital tools were reported to **function in all process steps**, there are differences in usage depending on the type of tool and innovation situation. Consequently, we see digital tools as a toolbox from which tools can be picked according to certain criteria.

On the upper layer, there are additional **service innovation highlights**. As the name says, these take the role of highlighting service characteristics in the process. Therefore, the characteristics flexibility, co-creation, and customer-centricity shall be stressed. Their appearance and importance vary depending on the innovation situation, project process, and involved stakeholder. While **customer-centricity** refers to the general focus on customer needs, **co-creation** refers to the active involvement of customers or other external stakeholders. Lastly, **flexibility** shall not only stand for the customization of the innovation process but also as a support mechanism to incorporate customer-centricity and co-creation.

Together, these elements form a **strong and holistic innovation process** where the process steps are at the centre. Digital tools further facilitate the work of the innovation project team to implement the service-specific elements of flexibility, customer-centricity, and co-creation.

Development of a digital tools platform

As the main goal of this work is to shine light on how the service innovation process can be digitally facilitated, the finalized digital innovation process for services shall now be used to map specific digital tools to he process steps. By mapping available digital tools on the market to the final innovation process,it shall be outlined which tools facilitate specific innovation activities and therefore support the innovation process. The final output shall be a crowdsourcing digital tools platform focusing on how to enhance innovation with the available tools on the market.



Definition of criteria for mapping tools

To map digital tools on the platform, we consider the digital innovation process for services as the foundation. The first level steps are considered as the main criteria which shall be offered for filtering on the platform, although the mapping of the tool will be done on the second level steps by constructing statements which can be ticked. Furthermore, the third level tasks of the process model are used in info boxes to offer a more detailed description and examples for the mapping statements, thus, offering further clarification. Figure 4 visualizes the relation between the developed digital innovation process and the selected process steps.

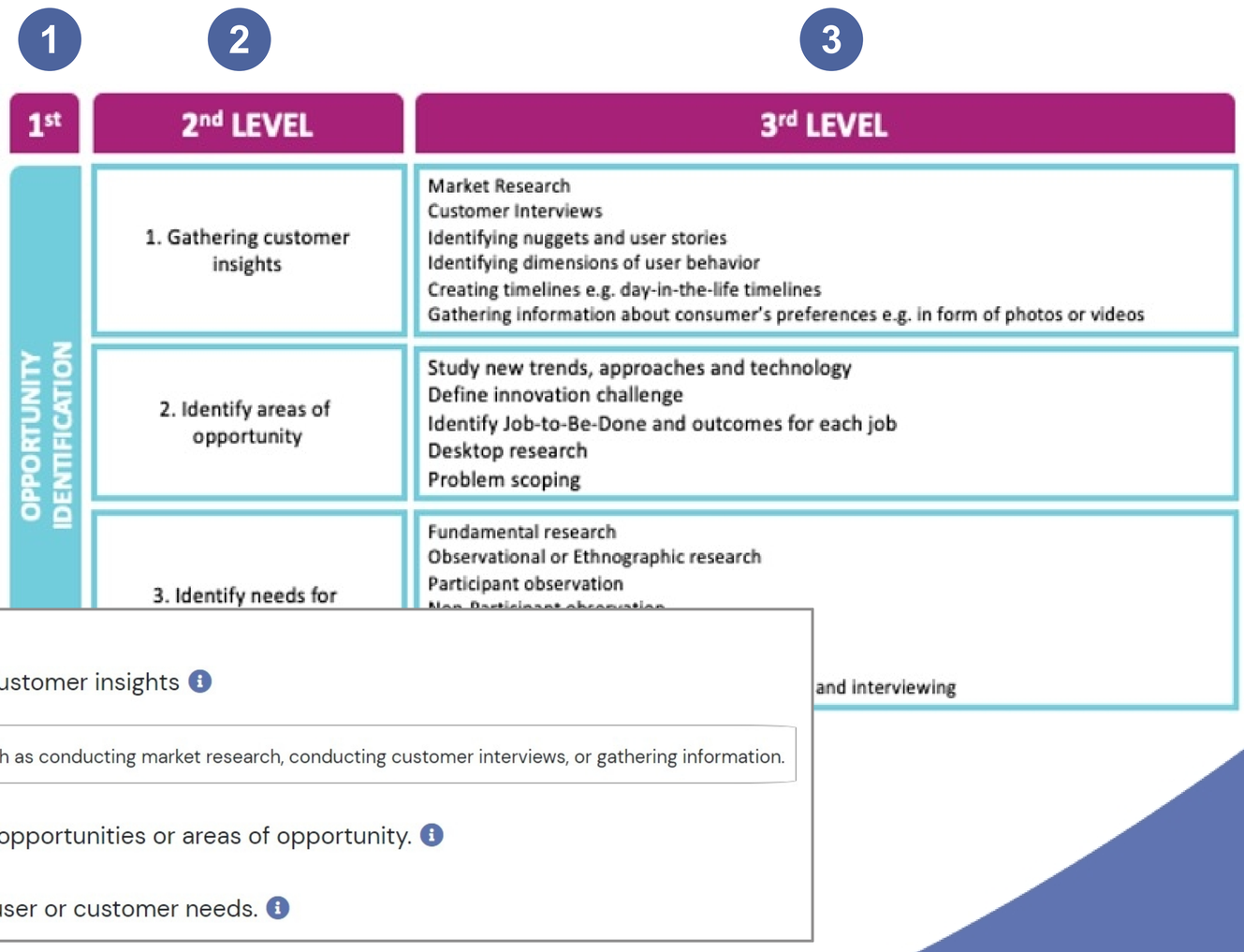


Figure 4: Exemplary visualization of the process step mapping methodology

Digital Tools Platform

Next to the process steps, some additional criteria were chosen to complete the picture and to give customers a good overview of the mapped tools. When mapping a digital tool, experts are required to answer a short questionnaire according to these criteria to summarize the tool's features and functionalities. All criteria are presented below.

Process Steps

Opportunity Identification

- Gathering customer Insights
- Identifying opportunities or areas of opportunity
- Identifying user or customer needs

Ideation & Idea Management

- Generating ideas
- Scoping ideas
- Assessing Ideas
- Prioritizing and selecting ideas

Concepting

- Generating concepts of the ideas
- Describing concept ideas
- Selecting the right concept
- Testing the concepts with users or customers

Development

- Implementing changes on the concept idea
- Experimenting with and/or simulating the ideas
- Developing different components of the solution
- Preparing for validation phase

Pilot Testing & Validating

- Installing and deploying the solutions
- Setting up a pilot solution
- Testing and validating the solution

Launch

- Launching the service

Additional Criteria

Process Flexibility

- Iteration between process steps
- Flexibility and customization in the process
- Settings for creating and customizing templates

Project Management

- Organizing and working in the project
- Interface for internal collaboration and communication

External Collaboration

- Interface for collaboration and communication with external stakeholders

Technical Criteria

Pricing

- Free
- Freemium
- Paid
- Subscription

Compatibility

- Desktop
- Online

After having filled in the questionnaire, a tool profile is created which visualizes the mapped criteria as well as some further details and links regarding the tool. Based on this criteria-led mapping process of digital tools, the digital tools platform provides an overview on which tool facilitates the innovation process in which specific process step.

The digital tools platform concludes the first output of the project "Digital Innovation in the Service Sector".

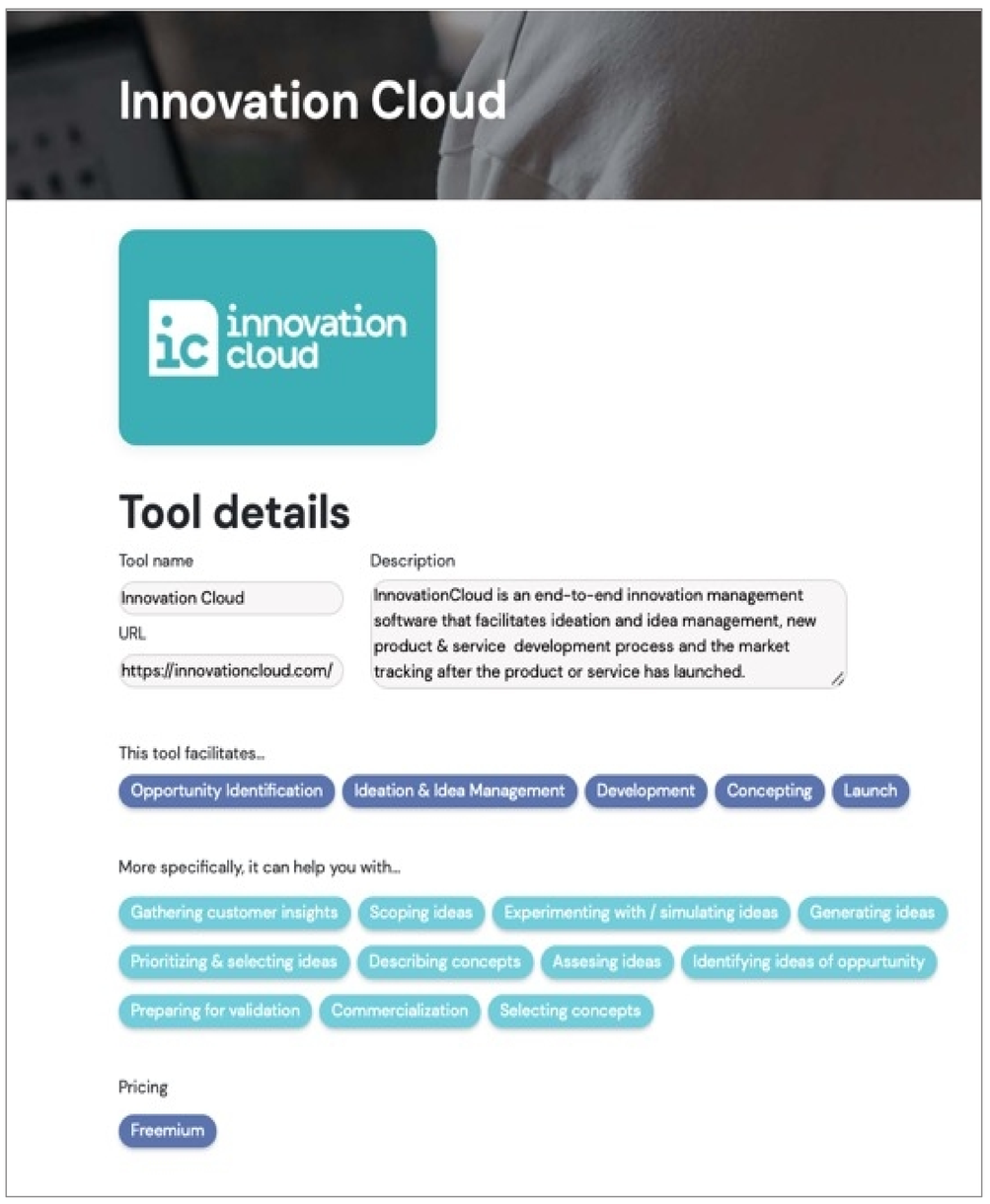


Figure 5: Example of a detailed tool profile.

Check out the platform and start mapping tools yourself!

Innovation Tools Scanner: https://scanner.innovatingdigitally.eu/

Conclusion

Seeking to develop a new understanding and a new model of service innovation processes in a digital format, through our analysis, this study makes several contributions to theory and practice.

1

Firstly, reviewing existing literature from a process perspective, this audit highlights the divergent discussion on linear and non-linear process models and their inclusion of iterative elements. The detailed mapping of 25 innovation process theories enables a consequent analysis of these theories to construct a digital innovation process for services. Further, this review contributes to practice in teaching future innovation experts and enabling companies to perform digital innovation for services by providing a scientifically grounded while practice-oriented process model.

2

Secondly, the conduction of 26 interviews and the inclusion of practical expert knowledge enriches the mapping of the innovation process as well as the understanding of digital innovation and service innovation. Thus, this audit fills the gap of providing an innovation process which highlights digital and service specifics and is easy to apply due to its practical nature. The targeted selection of relevant interviewees within the field of teaching innovation management in HE makes these expert insights valuable for the final outcome of this audit.

3

Thirdly, the rich results of the literature- and interview-based research are taken to practice by translating the findings into criteria for mapping digital tools and constructing a user-friendly digital tools platform which offers a selection of up-to-date digital tools and an easy filtering of these tools for the own innovation project needs. Furthermore, it allows interaction with the wider network through the collaborative nature of the platform which offers users the contribution of further digital tools. Thus, a constant updating of the platform can be maintained serving a long-term impact of the project.

The three major milestones – literature review, expert interview analysis, and digital tools platform – of this audit as well as the developed further resources shall form a basis for the next intellectual outputs of this project – (IO2) the digital innovation benchmarking tool and (IO3) the problem-based learning open education resources. Together with the upcoming outputs, the „Digital Innovation“-Project reaches for the goal of providing a modern course Curriculum for Higher Education educators with special emphasis on the way ‚innovation in services’ is taught.

About us

The Project

Nowadays, especially small companies are struggling to make use of their digital innovation capacity, in particular in terms of service offerings, although a wide range of possibilities are waiting for them. Based on this need for improvement, the Digital Innovation project has been developed by six European partners and accepted as Erasmus+ project.

With the aim to support higher education lecturers in developing and implementing improved and up-to-date courses on Innovation Management to impact not only effective digital skills into service innovation education, but also help digitising new service development in service sector businesses.

Starting with a Digital Innovation Audit to map a state-of-the-art service innovation development process, respective criteria will be selected to map relevant digital tools in an online platform. Based on the audit, a Digital Innovation Benchmarking Tool will be developed to assess companies in terms of their status-quo digital innovation efforts. Following these outputs, Problem-Based Learning Online Education Resources will be created to show how digital tools can be better used in the service development process, leading to more and better service innovation in companies.

For more information, see:

Project Website
https://www.innovatingdigitally.eu

LinkedIn
https://www.linkedin.com/groups/9011227/

Newsletter
https://mailchi.mp/d35e79a20855/innovating-digitally

Research Gate
https://www.researchgate.net/project/Digital-Innovation-13

NEW APPROACHES TO SME
INNOVATING DIGITALLY
SERVICE INNOVATION EDUCATION

Funding body
Erasmus+ Strategic Alliance

Timeframe
01.10.2020 - 30.09.2022
(24 months)

Objectives
(1) Support HE Educators in *developing* improved and up-to-date courses on Innovation Management

(2) Support HE Educators in *implementing* better and more up-to-date courses on Innovation Management

Partners
University Szczecinski
Stichting Hogeschool van Amsterdam
Momentum Marketing Services
European Universities Continuing Education Network
European E-learning Institute
Münster University of Applied Sciences

Authors

The first output of the Digital Innovation Project was produced by the team of Muenster University of Applied Sciences.

Dr. Sue Rossano Rivero
rossano@fh-muenster.de

Judith Helmer
judith.helmer@fh-muenster.de

Thien-Minh-Thuong Huynh
thuong.huynh@fh-muenster.de

References

Akaka, M., & Vargo, S. L. (2014). Technology as an operant resource in service (eco)systems. Information Systems and e-Business Management, 12(3), 367-384.

Alexandersdottir, A. (2015). Managing the front end of innovation. University of Iceland School of Business.

Barras, R. (1986). Towards a theory of innovation in services. Research Policy, 15(4), 161-173.

Beckman, S. L., & Barry, M. (2007). Innovation as a Learning Process: Embedding Design Thinking. California Management Review, 50(1), 24-56.

Biemans, W. G., Griffin, A., & Moenaert, R. K. (2015). New service development: How the field developed, its current status and recommendations for moving the field forward. Journal of Product Innovation Management.

Bouwman, H., & Fielt, E. (2008). Service Innovation and Business Models. In H. Bouwman, H. De Vos, & T. Haaker, Mobile Service Innovation and Business Models (pp. 9-30). Berlin Heidelberg: Springer Verlag.

Bouwman, H., De Vos, H., & Haaker, T. (2008). Mobile Service Innovation and Business Models. Berlin Heidelberg: Springer Verlag.

Carlborg, P., Kindström, D., & Kowalkowski, C. (2014). The evolution of service innovation research: a critical review and synthesis. The Service Industries Journal, 34(5), 378-398.

Cinar, E., Trott, P., & Simms, C. (2019). A systematic review of barriers to public sector innovation process. Public Management Review, 21(2), 264-290.

Cooper, R. G. (1990). Stage-gate-systems: A new tool for managing new products. Business Horizons, 33(3), 44-54.

Cooper, R. G. (2014). What's next? After Stage-Gate. Research-Technology Management, 157(1), 20-31.

Crossan, M. M., & Apaydin, M. (2010). A Multi-Dimensional Framework of Organizational Innovation: Systematic Review of Literature. Journal of Management Studies, 47(6), 1154-1191.

D'Emidio, T., Dorton, D., & Duncan, E. (2015, February). Service Innovation in a digital world. McKinsey Quarterly.

Dornberger, U., & Suvelza, J. (2012). Managing the Fuzzy Front-End of Innovation. intelligence 4 innovation, International SEPT Program, the Leipzig University.

Dörner, N., Gassmann, O., & Gebauer, H. (2011). Service innovation: why is it so difficult to accomplish? Journal of Business Strategy, 32(3), 37-46.

Grönroos, C., & Gummerus, J. (2014). The service revolution and its marketing implications: service logic vs service-dominant logic. Managing Service Quality, 24(3), 206-229.

Häikiö, J., & Koivumäki, T. (2016). Exploring Digital Service Innovation Process Through Value Creation. Journal of Innovation Management, 4(2), 96-124.

Herstatt, C., & Verworn, B. (2001). The „Fuzzy Front End" of Innovation. Working Paper No. 4, Technical University of Hamburg.

Jolly, V. K. (1997). Commercialization new technologies: getting from mind to market. Boston MA: Harvard Business School Press.

Kowalkowski, C., Gebauer, H., Kamp, B., & Parry , G. (2017). Servitization and deservitization: Overview, concepts, and definitions. Industrial Marketing Management, 60, 4-10.

Lusch, R. F., & Nambisan, S. (2015). Service innovation: a service-dominant logic perspective. MIS Quarterly, 39(1), 155-175.

Nylen, D., & Holmström, J. (2015). Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation. Business Horizons, 58(1), 57-67.

Osorio, C. (2009). Design Thinking-based Innovation: how to do it, and how to teach it? Retrieved March 2021, from http://uai.academia.edu/ CarlosOsorio/Papers/113671/Design_Thinking-Based_Innovation

Petzold, N., Landinez, L., & Baaken, T. (2019). Disruptive innovation from a process view: A systematic literature review. Creativity and Innovation Management, 1-18.

Ritter, T., & Pedersen, C. L. (2020). Digitization capability and the digitalization of business models in business-to-business firms: Past, present, and future. Industrial Marketing Management, 86, 180-190.

Silverstein, D., Samuel, P., & DeCarlo, N. (2009). The innovator's toolkit: 50+ Techniques for predictable and sustainable organic growth. New Jersey: John Wiley & Sons, Inc.

Srivastava, S. C., & Shainesh, G. (2015). Bridging the Service Divide Through Digitally Enabled Service Innovations: Evidence From Indian Healthcare Service Providers. MIS Quarterly, 39(1), 245-267.

Tate, M., Bongiovanni, I., Kowalkiewicz, M., & Townson, P. (2018). Managing the „Fuzzy front end" of open digital service innovation in the public sector: A methodology. International Journal of Information Management, 39, 186-198.

Thomke, S. (2003). R&D Comes to Services: Bank of America's Pathbreaking Experiments. Harvard Business Review, 70-79.

Tidd, J., & Bessant, J. (2020). Managing Innovation: Integrating Technological, Market and Organizational Change (Vol. 7). John Wiley & Sons, Inc.

Ulwick, A. W., & Osterwalder, A. (2016). Jobs to be Done: Theory to Practice. Idea Bite Press.

Van de Ven, A. (2017). The innovation journey: you can't control it, but you can learn to maneuver it. Innovation: Organization & Management, 18, 39-42.

Wheelwright, S. C., & Clark, K. B. (1992). Revolutionizing Product Development: Quantum Leaps in Speed, Efficiency, and Quality. New York: The Free Press.

Yoo, Y., Lyytinen, K., Boland, R. J., & Berente, N. (2010). The next wave of digital innovation: Opportunities and challenges: A report on the research workshop ‚digital challenges in innovation research'. SSRN.

Zomerdijk, L. G., & Voss, C. A. (2011). NSD Processes and Practices in Experiential Services. Journal of Product Innovation Management, 28(1), 63-80.

Disclaimer: These references only include the most relevant for and used in this white paper. For a complete list of all references used in this project, please refer to the full Digital Innovation Audit document. You can find the document here: https://www.innovatingdigitally.eu/audit/