
Business Model Innovation in digital eco-systems: E-learning industry Use-Case

Tobias Mahl*

WI Institute at htw saar – Saarland University of Applied Sciences,
Waldhausweg 14, 66123 Saarbrücken, Germany.
E-mail: tobias.mahl@htwsaar.de

Sarah Rübel

German Research Center for Artificial Intelligence,
Stuhlsatzenhausweg 3, 66123 Saarbrücken, Germany
E-mail: sarah.ruebel@dfki.de

Cai Hussung

German Research Center for Artificial Intelligence,
Stuhlsatzenhausweg 3, 66123 Saarbrücken, Germany
E-mail: cai.hussung@dfki.de

Christian Köhler

WI Institute at htw saar – Saarland University of Applied Sciences,
Waldhausweg 14, 66123 Saarbrücken, Germany.
E-mail: christian.koehler@htwsaar.de

* Corresponding author

Abstract: Digital (platform-based) ecosystems are the foundation of the most valuable companies in the economy worldwide. These ecosystems have shown they hold immense economic potential and can disrupt established industries. However, economic success is not their only added value. Through the interconnection of partners and customers, services and products can be improved, quality be increased, resources be pooled and innovations made possible. This requires appropriate business models. Therefore, this contribution explores the dynamics of business model innovation within digital platform-based ecosystems, focusing on a case study within the e-learning industry. It delves into the conceptualization and development of a platform-based digital ecosystem for continuing vocational training and education. The study addresses encountered challenges in the collaborative process of crafting a business model for a platform-based ecosystem and presents a concept for a novel digital platform-based ecosystem in the e-learning industry including its development process model.

Keywords: business model innovation; digital eco-systems; platform-based business models; e-learning industry; business model innovation processes

1 Introduction

Driven by progress in the field of IT components, whose constant increase in performance is constantly opening up new opportunities (Plattform I4.0, 2021) and by the penetration of digital technologies in the business world, politics and also in social interactions (Gatautis, 2017), companies with platform-based business models and ecosystems are among the most valuable in the world (Wortmann *et al.*, 2022). Investments in digital platforms increased more than 20-fold between 2010 and 2015 (Gatautis, 2017). This continuous shift towards value creation in digital ecosystems also creates the need for companies to adapt or rethink business models or develop new innovative business models (Gatautis, 2017), including the development of their own platforms or ecosystems.

In the area of continuing education and professional development, platforms are also on the rise. They enable customers to learn from anywhere and are supported by innovative digital technologies. These platforms have revolutionized the way individuals acquire new skills and knowledge. With the advent of online courses, webinars, and e-learning modules, the accessibility and flexibility of continuing education and professional development have reached new heights, and driven even further due to the influence of the COVID-19-pandemic (Maatuk *et al.*, 2022). Learners can now access a wealth of resources, from a wide range of subjects and industries, regardless of their location. Furthermore, these platforms leverage cutting-edge digital technologies to enhance the learning experience. Features such as interactive simulations, virtual classrooms, and AI-driven personalized learning paths cater to the diverse needs and preferences of learners (Kattoua *et al.*, 2016). This not only makes education more engaging and effective but also allows individuals to tailor their learning journey to their specific goals and pace.

As part of a government-funded joint research project with the aim of developing and testing new digital technologies to support learning processes on learning platforms, developing innovative new learning offerings and connecting learning platforms to enable the exchange of learning content, the development of a concept for an innovative business model was therefore started at the same time. The project involved partners from the continuing vocational training and education sector who operate learning platforms themselves and offer learning programmes for different target groups, institutes from the field of research into (AI-based) learning technologies and a company from the continuing vocational training sector that mainly offers face-to-face seminars and training courses.

The aim of the working group on business model innovation was to develop a concept for a business model that can offer added value for all partners and that can offer a wide range of players from the industry the opportunity to participate.

This contribution aims to present the business model concept for a digital platform-based ecosystem developed in the research project, to critically reflect on its development process and the challenges and barriers experienced for the concept.

Therefore the contribution is structured as follows: first theoretical background to the topics of platform-based business models, digital eco-systems as well as business models in general and challenges in business model innovation is given. Then, the research methodology for the development of the use-case is derived from existing business model innovation processes found in literature. Hereafter the use-case is described starting with the development process, intermediate results and the concept for a business model for a novel digital platform-based ecosystem in the e-learning industry. Chapter 5 critically evaluates the concept presented and reflects on the challenges that arose during the development process. Finally, an outlook on further development and possible research topics is given.

2 Theoretical Background

Platform-based business models and digital eco-systems

Platform-based business models are now the cornerstone of the world's most valuable companies (Wortmann *et al.*, 2022). They offer companies a great deal of potential for innovation and disruption, for example through the collection of data, the addition of digital services to products via the connection to platforms and the collaboration of developers, customers and partners (Madanaguli *et al.*, 2023). As early as 2009, Camarinha-Matos *et al.* described four different levels of collaboration between companies and the potential the collaboration holds for partners. Reasons that Camarinha-Matos *et al.* (2009) gave for collaboration, such as reaching larger customer groups or new markets, potential for innovation, efficiency through a shared infrastructure, profits through joint offers or lower costs, can also be found in literature specifically on platforms or digital ecosystems (Madanaguli *et al.*, 2023; Gatautis, 2017; Plattform I4.0, 2021).

Wortmann *et al.* (2022) identified seven different platform types as the core of platform-based business models, which are based on the primary activities for which platforms were created. A distinction is made between innovation platforms, value creation platforms, value exchange platforms, service and interaction platforms, work and education platforms, finance platforms and technology and data platforms. With different subtypes in each case, such as the collaboration platform subtype among the work and education platforms.

The authors of the "Platform I4.0" (Plattform I4.0, 2021) institution differentiate between digital platforms and digital ecosystems. The digital platform is operated by one or more actors and enables the provision of services or the execution of transactions, while the digital ecosystem includes all actors with different roles who interact in a network and use a common technical infrastructure. From this perspective, digital ecosystems were divided into 2 groups. There are pre-competitive ecosystems in the form of communities such as standardisation and open-source communities (e.g. the "OPC Foundation") and competitive ecosystems such as IIoT platform ecosystems and marketplace ecosystems (Plattform I4.0, 2021).

Despite the differences in the precise differentiation of platform concepts or ecosystems, common infrastructures are necessary in all cases in order to at least enable cooperation between different actors and to change, improve or enable completely new values through the exchange of knowledge, its bundling and the use of data (Madanaguli *et al.*, 2023; Plattform I4.0, 2021).

Business model innovation

In its early stages the term was used in the context of information technology for the modelling of business processes (Wirtz *et al.*, 2016). After publications by Drucker (1994) and Magretta (2002) the term was brought to the area of business management with the goal to describe and determine value capturing mechanism in companies (Magretta, 2002). Osterwalder *et al.* (2010) defined a business model as follows: "A business model describes the rationale of how an organization creates, delivers, and captures value" while Wirtz *et al.* (2016) described the business model as the result of companies strategy and a tool to support the coherent implementation of this strategy.

Drucker (1994) already identified the need for a continuous business model innovation in companies in order to keep up with the constant and fast changing economy. This was additionally substantiated by the studies of Lindtgardt *et al.* (2012) which show, that

business model innovations lead to a more sustainable success of the company compared to product innovations. This process can be supported by a variety of business model innovation tools from the literature. One of the most common tools is the Business Model Canvas (BMC) (Osterwalder *et al.*, 2010) which divides business models into 9 blocks that influence each other. Based on the BMC, further tools can be found in the literature that extend or adapt the concept for business models in specific areas, such as the circular economy (Joyce and Paquin, 2016) or product service systems (Mahl *et al.*, 2022a).

Challenges in Business model innovation

However, the process of business model innovation also poses various challenges and barriers. In the scientific literature, barriers or challenges can be identified in various areas. Firstly, there are barriers in the area of company resources in terms of the availability of personnel, necessary competences and skills as well as time and financial resources for the execution of the business model innovation process, especially in smaller companies and SMEs. Depending on the degree of innovation, high investment costs for the implementation of a new business model can also be a hurdle (Lins *et al.*, 2021a; Lins *et al.*, 2021b; Bocken and Geradts, 2020; Guldmann and Huulgaard, 2020). Furthermore the profitability of new business model is to be questioned (Lins *et al.*, 2021b; Bocken and Geradts, 2020; Guldmann and Huulgaard, 2020).

There can also be resistance to adapting the business model within the company, such as a too strong focus on the existing model, structures that slow down or oppose change, a lack of incentives for employees to get involved in the process or the fear of cannibalising the existing business model (Lins *et al.*, 2021b; Bocken and Geradts, 2020; Guldmann and Huulgaard, 2020). Additionally, there are external influences that stand in the way of the process, such as legal or regulatory conditions or a lack of knowledge about market conditions (Guldmann and Huulgaard, 2020).

In the context of collaboration in ecosystems, there are also other specific challenges, such as the need for interoperability between components or platforms with standards for data exchange and data availability, but also the responsibilities and roles of the participants in the network, the time required to set up the network and the trust between the partners (Guldmann and Huulgaard, 2020; Lenkenhoff *et al.*, 2018).

There are also tensions within ecosystems due to conflicting goals within the system, such as the need for easy access versus the desire to monetise usage by the provider, the need for collaboration between partners who are actually competitors pursuing their own goals that are not necessarily exactly aligned with the goals of the ecosystem, and the need for a high-performance and complex platform versus the need for low development costs (Mini and Widjaja, 2019).

3 Business Model Innovation Processes

Many different approaches to business model innovation are described in the literature, which vary greatly in the number of phases described and their focus, for example models with more general specifications versus models that require very specific activities.

Table 1 provides an overview of various approaches that have been identified in the literature on business model innovation.

Table 1 Overview of business model innovation process phases

<i>Lins et al. (2021b)</i>	<i>Lins et al. (2021a)</i>	<i>Wirtz and Daiser (2018)</i>	<i>Geissdoerfer et al. (2017)</i>	<i>León et al. (2016)</i>
awareness				
Requirements				
Analysis	Preparation	Analysis		Initiate
Creative phase	Idea generation	Ideation	Concept design	Bulding
Prototyping	Design	Feasibility		
Development	Evaluation & Selection	Prototyping	Detail design	Operating
		Decision-making		
Implementation	Implementation	Implementation	Implementation	Transfer
Sustainment	Sustainment	Sustainability		

Sources: (Lins *et al.*, 2021b; Lins *et al.*, 2021a; Wirtz and Daiser, 2018; Geissdoerfer *et al.*, 2017; León *et al.*, 2016)

All of the processes shown in Table 1 are very similar in essence. Apart from the process according to Geissdoerfer *et al.* (2017), all processes include, to a greater or lesser extent, preparatory analyses of the initial state of the existing business model, the market situation and the like. Subsequently, initial concepts are developed in all models, which are tested and evaluated in the prototyping phase and subsequently require an adjustment of the concept. This iterative prototyping is particularly emphasised in the process according to Geierdoerfer *et al.* (2017). Finally, the process models include implementation planning, implementation and maintenance of the new business models.

Due to the framework conditions of the research project, the development of the use case described below focuses on the phases of analysis, idea generation and iterative prototyping.

4 Business Model Innovation: Use-Case

Development process - Analysis phase

The development of the business model concept for the digital ecosystem started with the analysis of the initial situation of three learning platforms as well as the conditions and influencing factors in the sector of continuing vocational education and training in general and learning platforms in particular as well as current trends in the field of e-learning.

The analysis of the business models showed that the business models of the learning platforms have a lot in common in terms of key partners, key activities, key resources and the resulting costs. The platforms work with experts and partners to create content and they focus on the operation and further development of their platform, the creation of new

learning programmes and the identification of new topics and partners, making the platform, the content and the partner network the most important resources.

The value proposition of the platforms is the same for all of them by offering target group-specific continuing education programmes via the platform, but they all have a different thematic focus and therefore serve very different target groups. In addition, all platforms pursue a different revenue model.

The analysis of the current situation therefore shows potentials but also possible barriers or challenges for collaboration. For example, efficiencies could result from collaboration in the identification of new topics and content partners. By combining learning units from different areas or combining units aiming for different levels of experience, new units could be developed for new target groups or existing learning units could be optimised for different target groups. Efficiencies can also arise through collaboration in the development and creation of new offerings.

Challenges arise on the side of the learning units, in their design and formats as well as in the revenue models. The learning units of the providers have a very different scope. In addition, presentations and arrangements are very specific. This makes it difficult to compare the individual learning units from a cost perspective. Furthermore, all providers are currently pursuing very different revenue models that are based on very different calculations.

The analysis of external conditions in the continuing vocational training and education sector was carried out analysing industry reports from various institutes in the field of education and continuing vocational training and education as well as various statistics.

The reports show that the use of informal continuing education is increasing, also in the context of lifelong learning and an ageing society, and that offers from "edu-tubers" are increasingly acting as competition (mmb Institut GmbH, 2022), while only around 13% of the working population has taken part in formal continuing education (Statistisches Bundesamt, 2022; Marder-Puch, 2023). However, the proportion of older people who continue their education is increasing as well as participation in further education in general (Klös, 2021). The most important training topics are seen in the areas of IT applications, data protection and occupational safety as well as user and customer training (mmb Institut GmbH, 2022). Furthermore, there are new developments in the area of learning technologies that can optimise and better shape the process of learning (mmb Institut GmbH, 2022). The formation of business ecosystems as well as trends towards open innovation and cooperation should also be mentioned, as well as the prediction that providers with innovative business models will gain market share (Klös *et al.*, 2021).

The analysis of the sector shows potentials but also risks or dangers. On the one hand, the trend of lifelong learning is beneficial and opens up new possibilities for adapted offers, but the segment of free and non-formal education ("edu-tubers") is a strong competitor. The trends towards collaborative innovation networks fit very well with the project goal of networking platforms and integrating new technologies.

Development Process – Idea generation

After analysing the initial situations of the platform providers and the continuing education market in general, the idea generation phase was started. Since the business model concept was to be developed within the framework of the use case of connecting the learning platforms for the development of joint learning offers and integration of different learning technologies, the first step was to gather requirements and expectations from the partners as an input for a first idea generation workshop.

This was carried out using a survey including 18 questions on general framework conditions, data exchange, billing of services and possible revenue models, the scope of services offered and the design of a standard learning unit.

There was agreement on the question of whether a sovereign platform should be at the centre of the concept to be developed and that all possible data on user behaviour, usage trends etc. should be collected via the platform in order to develop better offers. Access to the latest learning technologies was also viewed favourably.

Offering learning programmes via the new platform itself was viewed critically. Furthermore, the responses varied greatly with regard to the organisation of billing services between the platforms, the form and scope of learning units and possible revenue models. The actual generation of ideas started in the form of a workshop in which the information from the survey and analysis phase was introduced as input. In the workshop, the participants had the task, supported by the e3-value tool (Akkermans and Gordijn, 2003), which enables the visualisation of value creation networks, to develop one or more concepts for value creation networks for the collaboration of learning platform providers but also for the integration of learning technologies.

Two initial concepts were developed in the workshop. The first result was a multi-stage concept in which platforms initially work together in bilateral alliances and use the technology of the middleware for the exchange of content and, based on the experience gained from this collaboration, develop a new platform that acts as an orchestrator for the exchange of content and take over services such as connectivity, data exchange and billing and would itself act as a provider of learning programmes, in which the offers from the collaboration would be distributed jointly via the central platform.

Feedback for this concept included the statement that this would be a good way to start the network giving the initiators a great deal of control over all processes, yet it would require the initiators to build up structures that would be obsolete from the second stage on. It was also criticised that the new platform would act as an additional competitor.

The second concept was a central platform that would function primarily as a marketplace for learning content and learning technologies as well as collection and exchange of data and would be financed by transaction fees for each purchase/sale. The platform would also take over the connection to the network for the partners as well as the accounting. The platform would also offer its own learning programmes, which would be recombined from the partners' content, among other things, and learners would also be able to access learning programmes from the partner platforms via the central platform. The basic idea of a marketplace for content and technologies was rated positively by the participants, as was the collection of data on user behaviour on the platform. The lack of collaboration options and the platform's appearance as a competitor based on the partners' content were criticised.

Development Process – Prototyping

Based on the ideas from the workshop as well as the feedback and criticism an initial concept for a business model for the use case of networked learning platforms was developed using the Business Model Canvas (Osterwalder *et al.*, 2010) tool. This concept was revised and adapted in several stages in discussion rounds and interviews with the partners.

The initial prototype was a platform that acts as a central connector and orchestrator between the learning platform providers and also as a link to the technology providers as well as a marketplace for learning content and technologies, but also encourages joint cooperation and innovation. To support this workshops shall be organised on a regular basis in which analyses of usage data will be presented in order to develop new offerings

together with the partners or to identify potential improvements to existing ones. The revenue model consists of monthly fees for the connection to the network and to cover costs for the technical infrastructure and data analyses. In addition, transaction fees will be charged each time content is exchanged via the platform.

In the discussion rounds, the platform as a central point of contact and marketplace as well as the workshops for triggering collaboration and innovation through the provision of data were rated positively. A negative aspect was that there are other participants in the industry who do not use a platform themselves (e.g. providers of seminars that are changing their business model and content creators) should also have access to the network. A community function is missing, and information from the market is also required for innovation activities. Furthermore, the barriers to entry are too high due to a mandatory monthly subscription.

Business model concept

The developed concept for the business model of the platform-based collaboration and innovation network is shown in Figure 1.

The network is designed to enable participants to collaborate and innovate easily and quickly in the development of new offerings and to provide a network of diverse potential partners to drive new developments forward in a targeted way. The platform makes this possible through: quick and easy access to content, access to new learning technologies (i.e. adaptive learning paths), easy collaboration and innovation with other companies via community page, an expanding network, creating new offers through bundling of competencies, creating new courses through recombination with courses from other providers, certification services, reaching new customers through the platform, data analysis and market research services. In order to build, maintain and constantly improve good relationships within the ecosystem between all partners and to trigger innovation and collaboration, joint events are planned to take place regularly, in which results and trends from the market and data analysis are presented and to encourage the joint development of new offers.

In order to make access to the network suitable for all possible actors and different requirements and to keep entry barriers as low as possible, the concept offers three different service levels for the possible partners. It is also possible to participate in the network as an expert or interested party via the community function by registering free of charge. In the first service level platforms will be connected to the central platform to enable the purchase or sale of content with a one-time connection fee. In the service levels two and three platforms will also receive access to additional services such as results from data analysis and market research or the access to learning technologies. However, monthly payments are due here.

Figure 2 shows the developed ecosystem around the central platform. Content creators, experts and interested individuals are arranged on the left side of the central platform, the providers of learning technologies on the right and the connected providers of learning platforms below. White boxes visualise the market. Red lines show payment flows, while black lines visualize information and data exchange as well as communication possibilities. The partner platforms can obtain content from other platforms or content creators and access learning technologies via the central platform. Of course, each platform can decide for itself which content is released. It is not a requirement for partners to make all their content available.

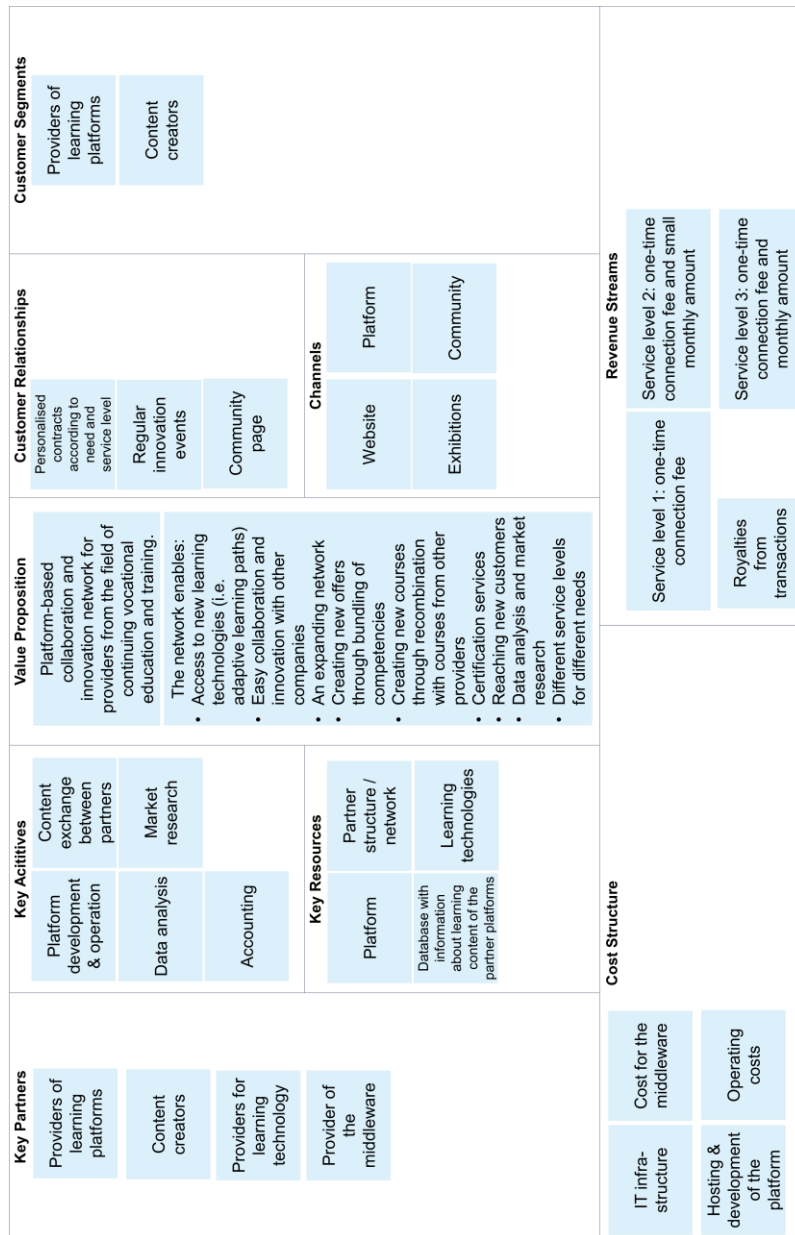


Figure 1 Business Model Canvas for the platform-based business model

Platforms can also offer no content at all and only act as buyers or, conversely, only offer content and not purchase any external content if this is the partner's wish. The central platform orchestrates the exchange and is responsible for accounting for all transactions between the partner-platforms. Partners do not have to sign separate contracts with or make payments to other partners. The central platform itself does not offer its own content and thus has no direct connection to the market.

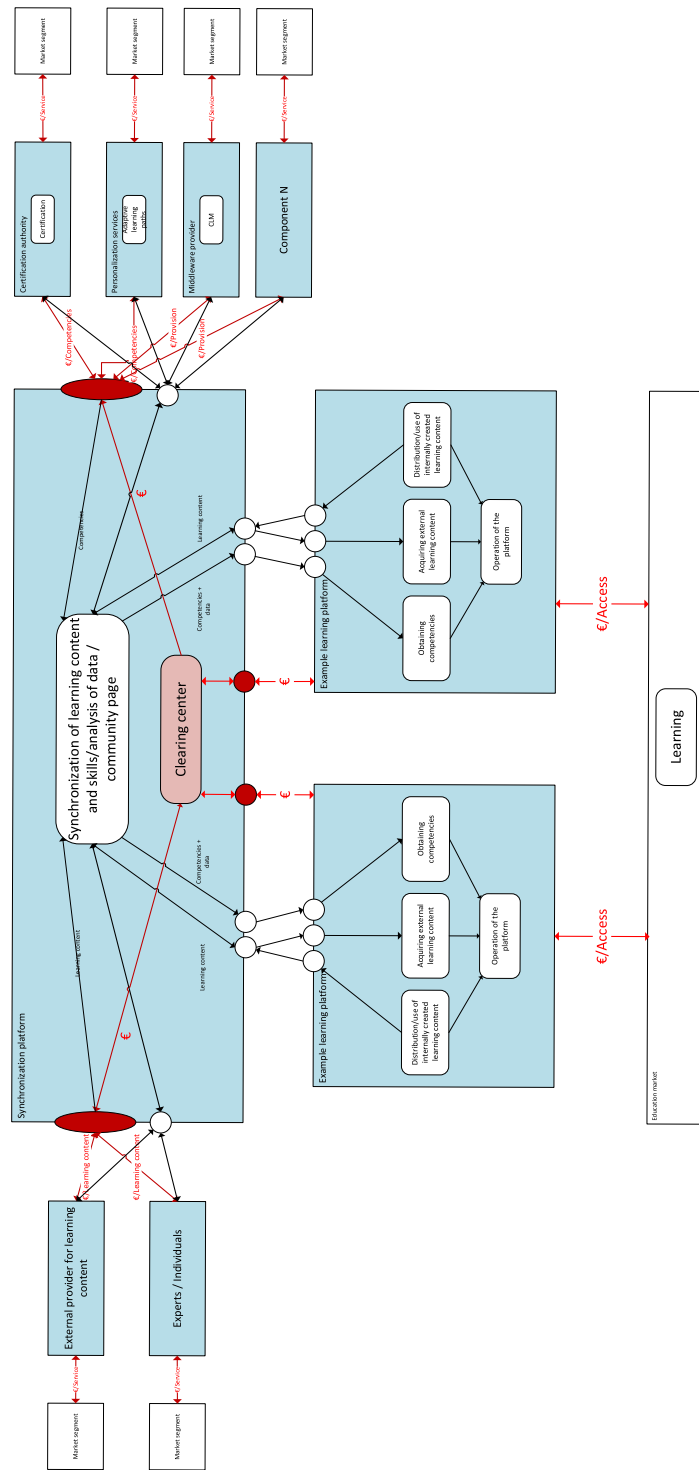


Figure 2 Concept for the platform-based digital ecosystem

5 Discussion

The concept for a platform-based business model developed in Chapter 4 is a partial result of a joint research project with the goal of developing and testing new digital technologies to support learning processes on learning platforms, developing innovative new learning offerings and connecting learning platforms to enable the exchange of learning content and additionally developing a concept for a business model that can offer added value for all project partners and that can offer a wide range of players from the industry the opportunity to participate.

The presented concept is intended to form the core of a digital platform-based ecosystem in the continuing vocational training and education sector. The platform is intended to bring together a wide variety of stakeholders from the industry and offer them a digital space for joint collaboration and innovation. To this end, the platform offers a community function for the exchange of knowledge and ideas, a marketplace for learning content and learning programmes that enables participants, above all providers of learning platforms, to sell their content or purchase external content to enrich or supplement their own learning programmes, or to develop completely new forms of offerings or learning programmes together with others. The platform also enables centralised access to learning technologies that can be used to enrich learning programmes in order to offer learners a better experience. In this way, the platform offers many different stakeholders access and the opportunity to participate in and benefit from the network.

The platform therefore offers potentials through collaboration and innovation for the participants in terms of efficiency gain and cost reduction in innovation processes, possibly reaching other or larger markets through the marketplace function, of profits through joint offers with other participants which are aligned with potentials that can be found in the literature (Camarinha-Matos *et al.*, 2009; Madanaguli *et al.*, 2023; Plattform I4.0, 2021). However, the concept was only developed within a small research project compared to the number of potential stakeholders from the industry. The concept therefore still lacks broad-based insights from the industry, especially from other learning platform providers and content creators regarding their acceptance of such an offer.

In addition, there is still a lack of a detailed economic viability analysis for the platform itself and a better presentation of the benefits for stakeholders is needed. Furthermore, there is still a lack of a concept including financial planning and a suitable legal form for the implementation of the concept.

Feasibility

All development steps for the concept so far have only been carried out internally and exclusively within the project. The next step, in line with the logic of the business model innovation processes presented in Chapter 3, is to conduct a feasibility analysis for the concept. Mahl *et al.* (2022b) have presented an approach for the iterative analysis for the feasibility of business models. In this concept, the analysis comprises four dimensions: Technological feasibility, marketability, organisational feasibility and non-monetary and monetary benefits.

As the main objectives of the project are the development and testing of new learning technologies, a prototype of a learning programme, which is made up of content from three different learning platforms, integrates additional third-party learning technologies and can be obtained via a third external platform, has already been created and tested with external persons in the area of technological feasibility. The basic technological feasibility has

therefore already been verified. However, further development work is still required to achieve final market readiness.

Further analysis is also required in the dimensions of marketability, organisational feasibility and non-monetary and monetary benefits, since for the development of these areas only information from within the project was gathered so far and it lacks insights from external stakeholders. This includes, among other things, an external evaluation to get feedback on the general acceptance of the concept from other perspectives as well as suggestions for improvement and adaptation and to improve it in further iterative steps. However, this evaluation is only in preparation at the time of writing.

Challenges and barriers in the process

Within the development process the project team faced a number of challenges and barriers. In terms of resources, the lack of expertise and financial resources described in the literature did not pose a problem. However, high costs are expected for the implementation of the concept and there is still a lack of a suitable legal form and a detailed presentation of the profitability of the platform. For the demonstration of profitability more information is needed, which would also possibly need sensitive information from partners. There was also a time hurdle in the sense that the project partners were geographically separated by several hours. This meant that face-to-face meetings were rare. In addition, the project started during the coronavirus pandemic, which made face-to-face meetings even more difficult. However, face-to-face meetings led to the best results in the discussion rounds and workshops compared to online workshops or surveys. The need for many partners to participate also made it more difficult to find dates, which led to longer intervals between the working meetings and a longer retrospective always had to be carried out at the beginning of the workshops.

In the dimension of external barriers or challenges, it has not yet been possible to identify whether there are regulatory or legal hurdles, and there is also still a great need for information regarding the needs and requirements of a larger group of stakeholders from the industry.

Interoperability was not a problem, as the middleware with its ability to translate between different standard formats (e.g. LTI, SCORM) represents a major advantage.

A very comprehensive challenge is the wide-ranging need for information in order to detail the concept and better identify potentials and benefits. While the partners possess valuable expertise that serves as a competitive advantage, they approach information sharing with careful consideration.

This seems to be a mutually dependent barrier: the concept would have to be clearer and emphasise clearer monetary and non-monetary benefits in order to persuade potential partners to provide resources for the development (cooperation in the detailed design, providing information, etc.), but this would initially require more input from potential partners (e.g. in the design of the standard for the content in order to enable an economic calculation).

In addition, the coordination of cooperation with many partners is initially a challenge in itself and subsequently also the alignment of the many different requirements and interests of the partners. With an even larger circle of partners, the complexity would probably become increasingly difficult to manage, but a large circle of participants is also required for the network. Furthermore, there is still a lack of knowledge about the acceptance of the concept by a broad mass of stakeholders and generally a lack of sufficient potential participants to give the ecosystem its value.

The development process starting with the comprehensive analysis of the current business models of the company partners, the generation of ideas and the iterative development of the prototype concept seems appropriate to the project team and does not require any adjustments so far. From a methodological point of view, however, the process could be better supported. Although the BMC is very well suited to modelling and analysing classic business models, it cannot be used to map the entire complexity of a digital ecosystem. In addition, the BMC does not allow the mapping of external influences and trends that have an impact on the ecosystem or the necessary competences that are required. Furthermore, in the case of this ecosystem, the partners and customers of the business model are in principle the same group. To support this, the ecosystem with its various participants was modelled during development based on the concept of the e3 value tool and information, payment and data flows were depicted. In this way, a better understanding could be generated among all participants in workshops.

6 Outlook & Conclusion

This contribution presents a business model concept and a development process for a digital platform-based ecosystem as well as insights on challenges and barriers that occurred in the process. The concept was developed as part of a joint research project and is currently still in the iterative prototyping phase to analyse its feasibility.

The concept describes an innovation and collaboration network that aims to connect learning platform providers, providers of content for continuing education, providers of learning technologies and experts in the field of continuing vocational training. The aim is to enable the exchange of learning content in the form of a marketplace and to support network participants in the joint development of innovative new offerings through services such as innovation workshops and data and market analyses.

The basic technical feasibility for the concept has already been verified as part of the research project. However, further tests and developments will be necessary. From the perspective of marketability and organisational feasibility, comprehensive supplementary evaluations with external experts are still required in order to further detail the concept and better demonstrate the benefits of the network.

The result is limited by various factors: the development was mainly carried out by a small core team and it has only been possible to collect feedback and criticism from a small group of stakeholders. However, the group of potential stakeholders is much larger. In addition, the concept is still under development and further investigations into the feasibility of the concept are required before a detailed implementation concept can be developed.

The development process was based on approaches for business model innovation already described in the literature and focussed on the phases of analysis, idea generation and iterative development of a prototype concept. This was methodically supported by the use of the Business Model Canvas and e3-Value tool. The tools complemented each other very well when it came to visualising the digital ecosystem. However, a combination of the tools in a new method could possibly provide better support for the development process.

In conclusion, it can be stated that the chosen development process provides a promising approach for conceiving a digital platform-based ecosystem. The application of the process in a single use case has already yielded valuable insights and confirmed the basic feasibility. However, it should be noted that further comprehensive tests and developments are necessary to ensure the applicability on a broader scale. These extensions will be crucial to fully validate the process.

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