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Business model design and ecosystem innovation: a method for visualizing interactions

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Abstract. In this article, we consider the existing literature in business ecosystem design and business model design to propose a method called *Bifocals*. The method aims to align the two ecosystem and business perspectives. We illustrate how to use Bifocals by describing how we supported the creation of a new service, which adapts to recent evolution in the business ecosystem of nursing homes. The access to the field for the instantiation of the method is provided by an ongoing research project, which is mainly addressed to managers of nursing homes. Indeed, recent events have obliged nursing homes to redefine the interactions among stakeholders in their business ecosystem. In the end, we claim that our method (a) allows representing in greater details the niche ecosystem where the firm is located, (b) it offers a more structured way to respond to an ever-evolving ecosystem, and (c) it underlines a coherent way to build and test new business model features to restructure the firm, in response to its ecosystem.

Keywords: Business ecosystem, business model design, innovation ecosystems, nursing homes, design science

1 Introduction

This article investigates the relationships between business model innovation in one or more organizations and the evolution of the ecosystems that are connected to them. In particular, we are interested in how those relationships and changes can be represented for the involved organizations may eventually respond in a satisficing way, by redefining the interactions among stakeholders in their business ecosystem. In this article, we consider a *business ecosystem* as an "economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world" [1]. Business ecosystems focus on customer value creation, and the actors have

several reasons to stay together or actively participate in the orchestration of their ecosystem [2]. Hence, our research questions guiding the research are:

Q1: How to represents the changes in business ecosystems due to the adoption of new business models

Q2: How to adopt that representation to assess a business ecosystem for an organization willing to conceive new services with new business models?

Moreover, we consider the business ecosystem of nursing homes as the substantive domain of the research. The access to the field is provided by an ongoing research project, which is mainly addressed to managers of nursing homes. Indeed, recent events have obliged nursing homes to redefine the interactions among stakeholders in their business ecosystem. We refer to [3] to define a *nursing home* as a facility that provides 24-hour functional support for people who have identified health needs and require assistance with activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Such a place may or may not be staffed with health care professionals and it provides long-term care and/or rehabilitation as part of hospital avoidance or to facilitate early hospital discharges. In recent years, European countries have explored new forms of nursing homes, such as day-care services as well as retirement communities and flats built close to but not in care homes [4]. Such movement towards decentralization of hosting solutions for patients might require new transportation solutions and the changes in the business ecosystem may offer new opportunities for innovation. Thus, in our case, the focus is on conceiving a "new transportation service". In particular, we consider the use of digital platforms as, for example, Uber for the access of healthcare services from a specific part of the aging population. Services like GoGo grandparent allow seniors, who are not familiar with smartphones to book their Uber or Lyft by phone, whereas specialized drivers from SilverRide escort riders out of their homes, help them transfer into and out of the car, and then accompany them to their specific destinations. Taking the above issues and questions into account, in this article we consider the existing literature in business ecosystem design and business model design to propose a method called *Bifocals* that aims to align those two perspectives.

The rest of the paper proceeds as it follows. Section 2 reviews the relevant literature to answer our research question and underlines a research gap. Section 3 describes how we applied design science to develop an artifact that addresses the research gap. Section 4 describes our artifact in the shape of a method to switch from ecosystem design to business model design. Section 5 offers an example or *instantiation* of how the process can be used to develop new services to adapt to an evolving business ecosystem. Section 6 illustrates our preliminary results and Section 7 concludes the paper by highlighting its contributions and limitations.

2 Theoretical background

Among the early scholars that introduced the notion of ecosystem in the management literature, Moore [5] claimed that "in a business ecosystem, companies co-evolve capabilities around an innovation: they work cooperatively and competitively to support

new products, satisfy customer needs, and eventually incorporate the next round of innovations." Since then a vast literature has been produced on the topic of ecosystems [6–9]. Among the different definitions, [6] considered an ecosystem as "the alignment structure of the multilateral set of partners that need to interact for a focal value proposition to materialize" further proposing two views for its conceptualization. The first view (*ecosystem-as-affiliation*), focuses on the association of actors based on their affiliations to networks or platforms; the second view (*ecosystem-as-structure*) emphasizes the configurations of activity guided by a value proposition [6]. As to those issues, [8] outlined the differences between market networks and ecosystems, which are characterized by the management of "non generic complementarities in the absence of full hierarchical control". Furthermore, [9] has identified through a comprehensive literature review a set of characteristics that jointly distinguish ecosystems from other collecting forms of organizing: the participants' heterogeneity, the facilitation of collective outputs greater than individual participants outputs, their technological, economic, and cognitive interdependence, and the specific of governance that allows for co-alignment among ecosystem participants with specific roles not formally established by formal contracts. According to [9], a business ecosystem is a specific type of innovation ecosystem that can be generally defined as "a community of hierarchically independent, yet interdependent heterogeneous participants who collectively generate an ecosystem output and related value offering targeted at a defined audience." Also, [10] pointed out the need for studying ecosystems from an open innovation perspective, thus extending the focus of the scholars interested in that field from a focal firm-based perspective to an extensive consideration of other participants in the networks opened up for innovation purposes. As to these issues, [11] lists a set of recommended principles on how to successfully innovate in ecosystems related to the circular economy by performing three relevant processes: (a) *collaboration*, (b) *experimentation* and (c) *platformization*. This latter point is particularly relevant for the role attributed to digital platforms as the locus of interaction, collaboration, and experimentation for innovation ecosystems [12, 13]. The connection between business model and ecosystems has been considered especially by the literature that has questioned business model design for innovation [14–17]. In this article, we consider the following definition of business model innovation as "as the design and implementation of an activity system that is new to the focal firm or new to the product–market space in which the focal firm competes" [18]. However, notwithstanding the linkages to ecosystem's actors and elements in the available conceptual models and software/tools for the design of business models [18–20], business model and ecosystems design has followed different and often separated paths.

In order to create and capture more value from the innovation of existing ecosystems [21], an increasing number of authors have engaged in providing frameworks and techniques to map their different actors and interactions. Among them, [22] have specifically considered the alignment between the different layers that characterize the activities within an innovation ecosystem and that can be distinguished as *explorative* or *exploitative*. Moreover, from a strategic management perspective, [23] proposed to move from identifying value propositions to put them into action through a value blueprint that aims to map the impacted ecosystem. A recent technique called *Ecosystem Pie Model - EPM* [24] allows to visualize (a) the strategies for aligning the actors to the

value proposition of the ecosystem [25], (b) the interfaces of collaboration between parties [26], (c) the types of complementarity between the different actors [27]. Accordingly, the structure of their resulting model [28] is composed of six constructs that determine the risk of the project: an "Actor", who has a "Dependence" to the ecosystem, has access to "Resources" that are used in "Activities" to produce "Value addition" and enable "Value Capture". Finally, in their analysis concerning care coordination, [29] identify three capacities for firms in a changing ecosystem: (i) the capacity to understand the ecosystem; (ii) the capacity to respond to an ever-evolving ecosystem; and (iii) the capacity to structure itself in response to its ecosystem.

Accordingly, we argue that it seems possible to (a) assess the environment with the process of [11] and find new collaboration in the ecosystem niche, (b) use the EPM to perform experimentation, and (c) restructure the firm to develop a platform by using existing business model design tools such as the value proposition canvas or the business model canvas [30]. Moreover, we refer to [31] to adapt the classics risks addressed by design thinking into business model components: lack of product/service desirability (a problem-solution fit), lack of technical feasibility (à product-market fit), or lack of economic viability (à business model fit). Nonetheless, a single coherent process to do these three steps appears to be missing in the literature.

3 Research method

In this Section, we position our study in the field of design science research [32] and we describe how we developed an artifact under the shape of a design science research method, by following the steps outlined by [33].

(1) **Identify the problem and motivate**: As described in Section 1, we center our analysis around the evolution of nursing homes, and we look for new transportation services that involve multiple actors in the business ecosystem.

(2) **Define objectives of the solution:** As shown in Section 2, we intend to combine existing literature from business ecosystem innovation and concepts for business model design in one single method.

(3) **Design and development**: Section 4 illustrates how we combined tools in ecosystem design and business model design, to (i) visualize the evolution of the ecosystem, (ii) find new solutions to respond to an ever-evolving ecosystem; and (iii) suggest the changes to implement and the testing strategy to validate the business hypotheses.

(4) **Demonstration**: Section 5 illustrates an example of how to use the BiFocals method to visually describe a transportation service that follows new trends in the business ecosystem of nursing homes.

(5) **Evaluation:** Section 6 describes the preliminary feedback received by a startup offering the service conceived, by using the Bifocals method.

(6) **Communication**: We have started sharing the preliminary results via academic conferences and we plan to submit our full report once the first phase of data collection will be completed.

4 The artifact

In this Section, we illustrate how we created our method, which we called *Bifocals*, to underline the fact that it allows to bridge business ecosystem to business model design. To this end, we consider two of the approaches mentioned in the previous Section, the principles proposed by [11] for ecosystems innovation and the EPM by [28] together with the perspective by [31] and Osterwalder et al., 2020 [30] for business model design. Those contributions ground the key components of the Bifocals method, whose conceptual model is shown in Fig. 1 and that we discuss in what follows by using the details provided by Table 1.

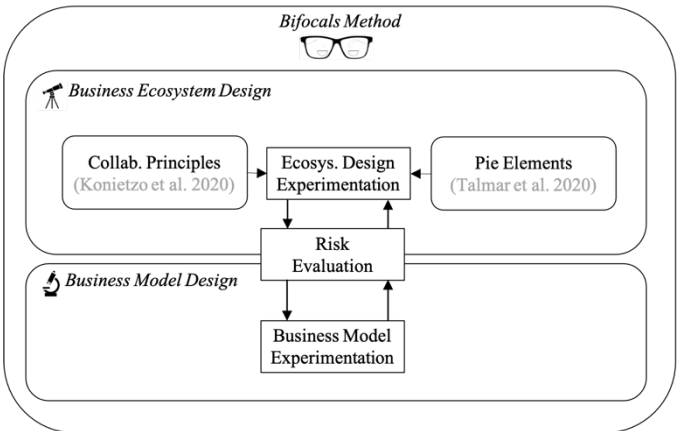

Fig. 1. The Bifocals method: a conceptual model

In the first column of Table 1. we follow the principles proposed by [11] and we represent them by linking together the elements of the EPM [24] in the second column, which deals with experimentation. In particular, as the substantive domain of interest, we take the point of view of the nursing home and we make a distinction between internal and external resources/activities/value addition components. This allows focusing on the niche ecosystem mentioned by [25], while visualizing the flow of information, goods, and money. That leads to the first testable proposition: **(P1)**: *the ecosystem component of the Bifocals method allows representing in greater details the niche ecosystem where the firm is located*

By observing the links among components shown in the EPM canvas, it is possible to underline features that can be "Eliminated", "Reduced", "Raised" or "Created" [34]. In addition to that, the process of [11]allows addressing the right questions in the right order. That leads to our second testable proposition **(P2)***: the value alignment component of the Bifocals method offers a more structured way to respond to an ever-evolving ecosystem*

Table 1. Steps of the method including the considered items.

Collaboration Step (C)	**Item: Business Ecosystems Design Principles** *(Konietzko, Bocken, and Hultnik, 2020)*	**Item: Elements in the EPM** *(Talmar et al., 2020)*	**Item: Types of Business Model Design Risks** *(Amarsy 2014; Osterwalder et al., 2020)*
C1	Define a partner selection process	Internal Resource/Actor	----
C2	Involve new actors from different industries and sectors	Actor	----
C3	Establish and maintain trust	External Activities > Internal Activities	Technical Feasibility
C4	Get commitment and buy-in	External Activities > External Activities	Product Desirability
C5	Align individual and shared interests	Value Addition > External Activity	Product Desirability
C6	Re-define actor roles and responsibilities	Value Addition > External Activity	Product Desirability
C7	Develop a decentralized and collaborative governance structure	Internal Activity > Internal Resource	Technical Feasibility
C8	Develop joint strategies and goals	Ecosystem Value Proposition (EVP)	Product Desirability
C9	Ensure fair value capture among involved actors	External Activity > Internal Value Capture	Economic Viability

For each step of the process, the third column assigns a type of risk derived from the literature on business model design [35, 36]. That leads to our third testable proposition: (P3)*: the business model component of the Bifocals method underlines a coherent way to build and test new business model features to restructure the firm, in response to its ecosystem.*

5 Demonstration

In this Section, we present the current situation in Switzerland concerning nursing homes, we briefly describe some of the trends for the future and we move on to illustrating the resulting Ecosystem Pie obtained with our method (Fig. 2).

In Switzerland, nursing homes (*Etablissement Médico-Social* in French and *Pflegeheim* in German) have hosted 122’000 people in 2017 for long-term stays of 3.5 years

on average [37]. According to the Swiss Federal Statistics Office [38], a Swiss nursing home exchanges data with five stakeholders: (A) the Federal Offices of Public Health and Social Insurance, (B) the insurers (D) the Cantonal public health services, as well as social welfare offices and statistical offices, (E) the research institutions and (H) the service and hosting providers concerned with the nursing home. Previous attempts to visualize the innovation ecosystem in healthcare, such as the one done by [39], allows us to add those stakeholders to Fig. 2 together with (C) the social and interest groups, (F) the suppliers, (G) the collaborators, such as the healthcare providers, which are usually separated from the hosting providers, (I) the customers and consumers that surround the immediate customer, that will be named here *informal caregivers*, (J) the immediate "customers", which will be named *Elderly people*.

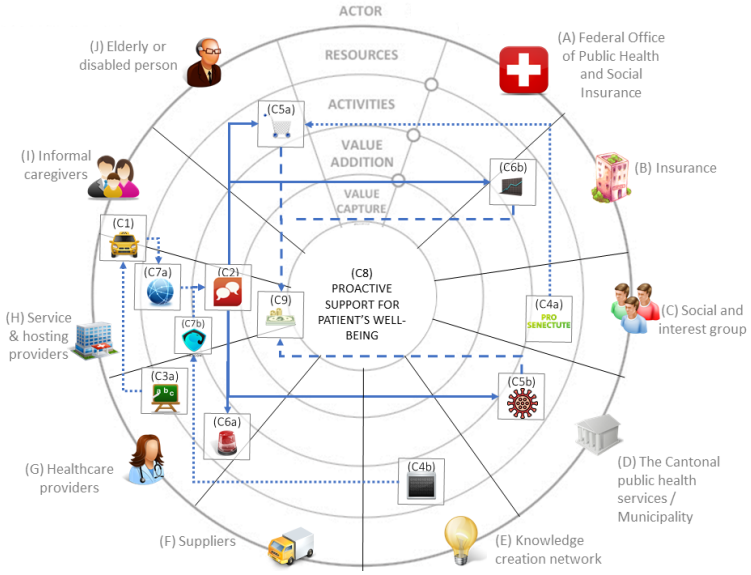

Fig. 2. Ecosystem Pie for a New Transportation Service Offered to Elderly People

The first principle proposed by [11] led us to select a niche of actors, who were in contact with the elderlies while they were not hospitalized. That led to the inclusion of informal caregivers as a resource for transportation (shown in Fig. 2 as step C1 and a taxi icon). Inspired by Uber, we thought if we could create a crowdsourced transportation system for elderly people. Indeed, it turned out that it already existed for disabled people [40]; nonetheless, it is offered by professionals instead of professionally trained volunteers. That led to the creation of a new component for value addition of the ecosystem (named C2 in the Fig. 2): drivers trained by care providers might be able to use the time spent driving to support the elderly people and collect information about their wellbeing. The fact of being trained by healthcare providers (named C3a in Fig. 2 and a blackboard icon), will establish trust among ecosystem actors interacting with the service, whereas Social and interest groups (such as pro-senectute in Switzerland, named C4a) will support the service by promoting its services to elderly people and

research institutes (C4b in Fig. 2) will offer the technological know-how to manage the platform.

The new value created will be linked to the current activities of other actors, such as doing daily shopping for elderly people (item C5a, which refers to the step) and helping the municipality to improve the nursing homes during the Covid-19 pandemics (item C5b). Moreover, a service that collects data while performing transportation might be important for doctors (item C6a) who can receive relevant data about their patients from professionally trained personnel and insurance firms (item C6b), who are willing to reposition themselves by sharing with their clients' data about their health risk (in Switzerland, this is currently possible as long as the health risk data is not used by the insurance to assess the financial risk of each client). Finally, the internal activities management of the network (item C7a) and decentralized autonomous organization (item C7b) will assure the decentralized governance suggested by step 7. Consequently, the joint goal of the niche ecosystem can be summarized as "*proactive support for patient's well-being*" (item C8), and the value capture activity to finance the new service would be a yearly subscription fee from the three actors, thus getting support for their activities (Item C9). Moreover, the arrows in Fig. 2 allows to assess the different types of business risk, expressed in the third column of our table: a) full arrows, like the one connecting the new value addition C2 and the shopping activity C5a, concern *product desirability*; b) dashed arrows, like the one connecting the shopping activity C5a and the value capture activity C9, concern *willingness to pay* and *business viability*; c) dotted arrows, like the one connecting the decentralized autonomous organization C7b and the new value addition C2, concern the *technical feasibility*.

An example of the business model side of our Bifocals method is the project Match'NGo of the new swiss startup ErgoSum Sarl [41]. During the beginning of the Covid-19 pandemics, the team has used the Fig. 2 to establish a minimum viable product made of a network of volunteers (C1) to transport elderly people in their daily activities (C5a) and test the technical feasibility of the system (link C3a-C1-C7-C2). To assess the economic viability and desirability of the system, the team has used Fig. 2 to define two business hypotheses to test: *(A) The clients of the system are the informal caregivers and the users of the system are the elderly citizens (link C2-C5a in Figure 5.1) and (B) The most important feature of the system is the possibility to receive a personalized diagnostic by using a certified checklist (element C2).*

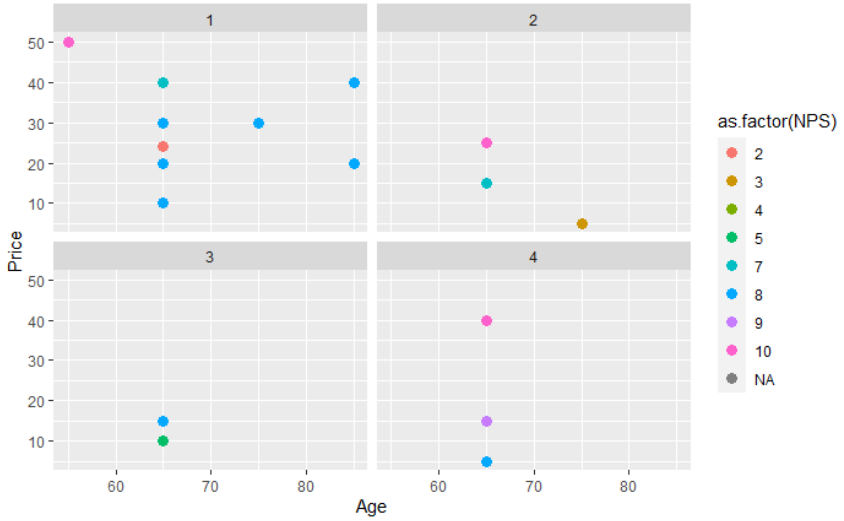

Fig. 3. Economic Viability (Price) and Desirability (NPS) for a New Transportation Service

Accordingly, four rounds of interviews have been conducted to assess their willingness to pay and their likelihood to suggest the service to a friend/relative (the Net Promoter Score). The first group (ALL AGES – DIAGNOSTIC) was composed of people of different ages, and it received the description of the transportation service with the possibility to receive a diagnostic of the personal well-being, which was done by a driver trained by professional nurses. For example, the pink dot in square 1 (on the top left corner of Fig. 3) shows that one participant aged around 50 years old (x-axis) was willing to pay up to 50 swiss francs for the service (y-axis), and he/she was very likely to recommend the system to a friend (as shown by the color scale for the net promoter score or NPS dimension). Accordingly, the results presented in square 1 show that the willingness to pay on the y-axis decreases as the age increases; in the meantime, the net promoter score of respondents in square 01 is fairly high across all the interviewed sample. The second group in square 2 (ALL – NO DIAGNOSTIC), did not receive the information about the possibility to receive a personalized diagnostic and commented on a transportation service done by a driver trained by professional nurses. The third group in square 3 (FOCUS – NO DIAGNOSTIC) was focused on informal caregivers, who mentioned that the system was not much needed by them and they didn't see the value for their parents. The last group represented by square 4 in the bottom right corner (FOCUS – DIAGNOSTIC) was composed of informal caregivers, who confirmed their intention to promote the service among their personal contacts, and their willingness to pay is considerably higher than groups 2 and 3. Therefore, we can confirm in Fig. 2 that the clients are the informal caregivers and the users are elderly citizens and that the personalized diagnostics is a game-changer in the willingness to pay of the potential clients. The idea has already won a startup competition [42] that took place at the end of May 2020 and which gave Match'NGo visibility across other actors in the ecosystem. The project managers are currently discussing with the Pro-Senectute association

(item C4a) and they have received a small grant from the swiss confederation to work with a research institution (C4b). In the meantime, they are working closely with different municipalities (C5b) to fine-tune their services.

6 Discussion

In this Section, we discuss our preliminary results by following the argumentative model of [43]. Considering the background that describes the problem and the research questions, as shown in Section 1, our research question concerns how to assess the business ecosystem of a nursing home and design new transportation services that are desirable, feasible, and economically viable. The relevance of this research question is grounded in longstanding socioeconomic trends (the increase of lifespan and the consequent expansion of healthcare expenses), recent shifts linked to new technologies (business model changes of insurance firms linked to recent developments in machine learning algorithms), and unexpected events (new safety guidelines following the worldwide spread of covid-19).

Our first claim is that our method allows to represent in greater detail the niche ecosystem where the firm is located. The reason for our claim is described in Section 2: previous scholars have described the innovation ecosystem in healthcare, but they have not used the EPM. In Section 5 we offered as evidence the description of how we managed to visually assess the interactions among actors, once we include informal caregivers. Compared to previous visualizations, our representation allows to see more in detail the ecosystem niche. Nonetheless, a possible reservation regarding our approach concerns the focus on one main actor, who seeks to orchestrate the ecosystem. Therefore, our boundary conditions are set around the use of this method for the orchestrator: if multiple actors want to obtain a unified representation of the ecosystem, our method might require additional features to obtain a common ground.

Our second claim is that our method offers a structured way to respond to an ever-evolving ecosystem. Indeed, the ecosystem PIE shown in Fig. 2 fits well for experimentation, but we wanted to extend its use through the method presented in Fig. 1. In Section 4, we described how to visualize the collaboration strategy and in Section 5 we're have shown how such a method had led to the identification of one new value proposition and additional revenue streams across actors in the business ecosystem.

7 Conclusion

This article describes an ongoing research project, which describes how nursing homes can adapt to changes in their ecosystem by offering new services. Recent events have obliged nursing homes to redefine the interactions among stakeholders in their business ecosystem, and by combining the existing literature in business ecosystem design and business model design, we propose a method called *Bifocals* to align the two ecosystem and business perspectives. We claim that our method (1) allows representing in greater details the niche ecosystem where the firm is located, (2) it offers a more structured way to respond to an ever-evolving ecosystem, and (3) it underlines a

coherent way to build and test new business model features to restructure the firm, in response to its ecosystem. We illustrate how to use Bifocals by describing how we supported the creation of a new service that adapts to recent evolution in the business ecosystem of nursing homes. Although the paper shows promising insights, our research project is currently ongoing and it has its limitations, as discussed in Section 6. The Bifocals method so far has led to the development of a single business idea, and we are planning to use it in the future to structure our discussion with owners of nursing homes and health department officers. The Bifocals method is a bridge between existing techniques in business ecosystem design and business design, and it cannot be used as stand-alone. Therefore, future research will continue to work on how to seamlessly integrate such tools into one coherent approach. The Match'NGo project has passed the first round of tests concerning product desirability and technical feasibility, but it is still at its initial stage. Nonetheless, such limitations allow future directions of investigations and future work will develop a more advanced prototype to validate product-market fit and business model fit.

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