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Preparing for business model change: the "pre-stage" finding

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Abstract The purpose of this paper is to investigate managers' initiatives in the context of an emergent technology and their effect on the business models of firms. Building on four case studies of organizations interested in using an emergent technology for commercial purposes, this study applies a process-based framework of business model change. The main finding is that managers' initiatives occur in the context of a "pre-stage" of potential business model change, which includes processes of experimenting and learning. The pre-stage finding gives a better understanding of when change initiatives affect a business model and when they do not, allowing managers to adopt a more proactive behaviour and guide their organizations towards effective business model change. The main contribution of this paper is to suggest the inclusion of the pre-stage idea in research and practice, since it is an intermediary step in the process of business model change that has been overlooked.

Keywords Business model · Change · Innovation · Processes · New technologies · Dynamic capabilities

1 Introduction

The emergence of a new technology in the market makes it important for established companies—even those with successful business models—to carefully analyse its commercial potential and change their business models accordingly, since there are many examples of leading companies, with successful business models, that have failed in the emergence of new technologies (Christensen 1997;

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Tushman and O'Reilly 2002). There are two different views of how to change a firm's business model: (1) some argue that careful analysis is necessary before effective business model change can occur (MacInnes 2005; Demil and Lecocq 2010; Chesbrough 2010; Cavalcante et al. 2011), while (2) others favour a more spontaneous and emergent approach, based on situated trial-and-error practices (McGrath 2010; Svejenova et al. 2010; Sosna et al. 2010). So far, there have been no attempts to establish a link between formal analysis and situated practices under the perspective of business model change.

This study, which investigates companies planning to use an emergent technology for innovative commercial purposes, is based on Cavalcante et al. (2011), who argue that there are four types of business model change. According to these authors, in order to understand whether a firm's business model has changed or not, and whether it has changed incrementally or radically, it is important to pay attention to the initiatives taken by individuals in the organization. The question guiding this research is: how do the initiatives taken in the context of an emergent technology affect companies' business models? This study uses Cavalcante et al.'s (2011) process-based framework in an empirical-based analysis of the impact of initiatives on firms' business models. The research approach used here thus integrates the analytical and the situated perspectives in an investigation of business model change.

Although research on business models is still in its infancy, it has received increasing attention since the late 1990s, when companies were starting to make the transition from traditional business to electronic(e)-commerce (see Tapscott et al. 1998; Timmers 2001; Chen and Ching 2002; Weill and Vitale 2001). Since then, research has evolved in different directions, including definitions of what a business model is (Morris et al. 2006), identification of central components (Shafer et al. 2005; Onetti et al. 2012), and the development of taxonomies based on criteria such as revenue and position in the value chain (Rappa 2001). In particular, there has been increasing interest in business model change. The joint use of the analytical and the situated perspectives should result in more cohesive and consistent research in this area.

The main result of this study is the discovery of a "pre-stage" of potential business model change, characterised by processes of experimenting and learning that can subsequently lead to actual business model change. The pre-stage finding can be understood as an intermediary phase prior to business model change, when firms need to develop their capability to change (Meyer and Stensaker 2006) through specific, focused organizational processes. The pre-stage contributes significantly to both research into and the practice of business model change by introducing the notion that firms need to develop *dynamic capabilities* (Teece et al. 1997), i.e. the ability to continuously reassess, renew and reconfigurate the firm's resources base (Eisenhardt and Martin 2000; O'Connor 2008; Ambrosini and Bowman 2009). During the pre-stage, this ability can be fully developed through experimenting with the processes needed to achieve the intended type of business model change, characterising a period of intensive learning.

The remainder of the paper is organized as follows. Section 2 presents a review of the literature on business model change and a brief overview of the literature on emergent technologies. The literature review on business model change presents the two mentioned perspectives, i.e. formal analysis and situated practices.

The literature on emergent technologies gives the basis for understanding the importance of new technologies for companies and the current practice of developing them through joint initiatives. Section 3 describes the methodology used in the investigation: the selected framework, the empirical setting and the case studies, data collection and analysis, and a description of the main findings. In Sect. 4, the findings are analysed more in depth and the pre-stage identified. Section 5 discusses the main aspects of a pre-stage for a potential business model change and the importance of moving from the pre-stage to effective business model change. The final section presents the conclusion of the study, which includes limitations, implications for practice, and avenues for further research.

2 Review of the literature

Research on business models is closely related to strategic management and dynamic capabilities, both derived from the resource theory of firms. Companies need to improve their capability to change over time while maintaining their everyday activities (Meyer and Stensaker 2006) in such a way that they can continuously learn how to strategically manage their resources base and remain competitive (Teece et al. 1997; Eisenhardt and Martin 2000; O'Connor 2008; Ambrosini and Bowman 2009). In this context, the business model perspective can be helpful in understanding how firms create, deliver and capture value (Osterwalder et al. 2005). Research on business model change is characterised by two different perspectives: formal analysis and situated (or "trial-and-error") practices. Whereas in the analytical approach individuals explicitly consider the possible outcome of choices, in the trial-and-error approach the focus is on experimental learning. Both approaches derive from Simon's notion of bounded rationality, and should be used jointly (Gavetti and Levinthal 2000, 2001).

Companies often carefully plan their change initiatives. Thus, it is only natural that, from the beginning, when companies needed to make the transition from traditional business to electronic(e)-commerce (see Tapscott et al. 1998; Timmers 2001; Chen and Ching 2002; Weill and Vitale 2001), most of the research in this area has been based on a more formal analytical process. Research on business models has focused a lot on definitions (Morris et al. 2006) and the identification of central components (Shafer et al. 2005; Onetti et al. 2012), and has only recently started to address business model change. Demil and Lecocq (2010) state that managers' decisions are an antecedent factor of business model change, which means that analysis is necessary before taking decisions to change the firm's business model. Chesbrough (2010) argues that it is important to construct maps of business models and try alternative combinations. However, few theoretical frameworks exist. MacInnes (2005), for example, deals with change on business models in the context of emergent technologies. He argues that it is necessary to take account of the different stages in the evolution of the technology and the obstacles to overcome accordingly, including: technical problems (in the first stage), environmental problems (second stage), commercial problems (third stage), and problems related to a mature technology (fourth stage). Osterwalder et al. (2005), Johnson et al. (2008) and Zott and Amit (2010), among others, suggest the

importance of core processes/activities to understand a firm's business model and how to introduce changes to it. Cavalcante et al. (2011) suggest a process-based view of business models, argue that there are four different types of business model change, and that not all change initiatives affect a business model.

The trial-and-error approach in the business model research area is a more recent perspective, and can be considered part of the contemporary view in social science that learning is practice-based (Yakhlef 2010). Scholars who favour the adoption of a process of trial-and-error argue that, in a highly uncertain environment, it is not possible to predict events through analysis, thus continuous experimentation and learning are necessary (McGrath 2010; Svejenova et al. 2010). Sosna et al. (2010), for example, describe stages of exploitation and exploration (March 1991) in the development of a company's business model, characterized by a process of trial-and-error. An important reason for approaching change using an ongoing situated perspective is the possibility of acquiring a better understanding of micro change-processes (Tsoukas and Chia 2002). Individuals' awareness and efforts to adjust their everyday activities while performing them (Feldman 2000) deserves recognition that continuous learning and change take place in organizations spontaneously, without formal planning.

An emergent new technology that can be used in a variety of applications, in different commercial fields, is an excellent opportunity to investigate how managers proceed in their initiatives to change. New technologies are a challenge for established companies. Tushman and O'Reilly (2002), for example, cite leading companies in the semiconductor industry in arguing how difficult it is for established companies to make the transition to a new technology. Christensen (1997) describes the case of the "disk drive" industry and the established companies that were unable to change and incorporate new versions of disk drives into their products. He suggests that established companies should place innovative projects with new technologies outside their organizational structures. Companies are increasingly trying to use new technologies to develop innovative commercial products and/or services through joint initiatives, such as temporary task forces, coalition and network structures (Mandell and Steelman 2003). Iansiti and West (1997) argue that experimentation with different technologies simultaneously is a common practice among companies, and that some firms are increasingly focusing on applied research, where several partners collaborate to explore new technological possibilities. Exploring new possibilities is especially important nowadays, when there is a tendency for new technologies to be developed for a more general use (Gambardella and McGahan 2010), and cooperation is essential for bringing technology onto the market (Siegel et al.'s 1995).

3 Method

3.1 Framework for empirical research

Organizational processes have proved to be a powerful mechanism for change. Scholars such as Johnson et al. (2008) and Zott and Amit (2010) have stressed the importance of core processes/activities in their analysis of business models and business model change. For several reasons, Cavalcante et al.'s (2011) process-

based framework was chosen for this investigation: (1) First, according to their framework, core organizational processes are central to understanding the boundaries of the firm's business model. Since the framework does not specify the most important central components of the firm's business model, it favours empirical research as a way of identifying the core processes of the firm. (2) Second, the framework establishes a direct link between the type of business model change and the change initiatives of the various individuals concerned, which makes it possible to reconcile the analytical and situated perspectives when studying business model change.

Cavalcante et al. (2011) suggest a new concept of the term business model ("an abstraction of the principles supporting the development of a firm's core repeated processes"), and argue that not all change initiatives affect a firm's business model. In Fig. 1, change initiatives that affect a firm's core repeated processes are distinguished from those that do not. Business model change takes place only when a change initiative affects a firm's core processes, and before there are challenges of different nature to overcome. The four different types of business model change are: (1) business model creation, which refers to the materialization of a business idea into a new venture; (2) business model extension, by which is meant improving the business by adding new processes; (3) business model revision, which involves intervening in existing core process(es) and replacing it/them with new one(s); and (4) business model termination, that is, abandoning/removing core processes. The challenges to overcome vary depending on the type of business model change—for example, business model revision involves more complex challenges than business model extension.

3.2 Empirical setting and case studies

In 2008, a number of Danish organizations established a university–industry consortium for research into and the future commercialization of a new European Global Satellite Navigation System (GNSS), simply referred to as "Galileo technology", which is expected to be available by 2013/2014. The Galileo technology will be similar to the existing GPS technology, but the hope is that Galileo will present some innovative technical characteristics (such as indoors positioning and more accuracy and availability of its signals) that will make possible for companies to develop a variety of innovative commercial applications, to be used in different commercial fields (ESA 2005). An important requirement of the technology is that companies must themselves find ways of incorporating it into innovative products and/or services—in this sense, this new technology is not a package solution. The establishment of the Danish university–industry consortium was a unique opportunity to investigate the reactions of companies to a new technology, since the participants manifested interest in the emergent technology through a formal agreement, signalizing that they would be actively engaged in taking initiatives of change. The main idea of this study was to select some companies in the consortium and use the theoretical framework to understand the effect of managers' initiatives on the firms' business models, based on case study research.

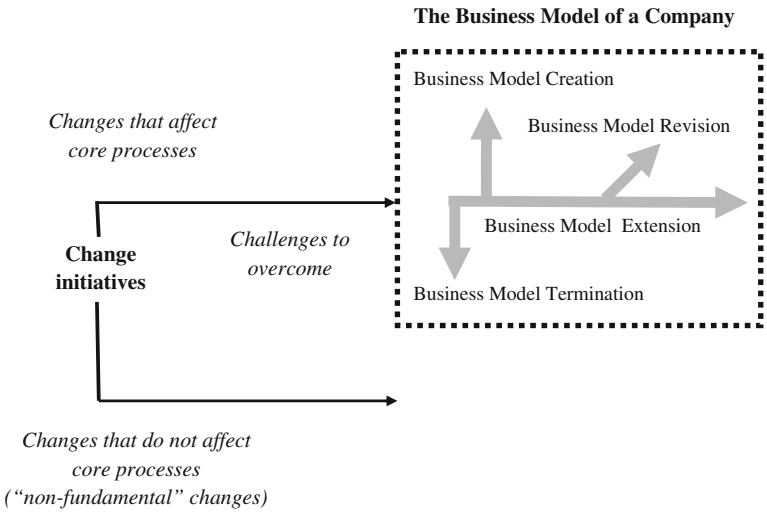

Fig. 1 Framework of business model change for empirical research. *Source* author's elaboration, based on Cavalcante et al. (2011)

In order to understand how the case studies for this research were selected, it is necessary to say a few words about the Danish university–industry consortium. The consortium was composed of six core partners (three firms, two universities and one applied research institute), with eight firms expressing interest in future collaboration. All participants in the consortium have signed a formal agreement on specific roles and tasks to be performed in the development of a positioning technology platform. In the period 2008/2010 (the period of the research), this was at the stage where the participants met regularly to carry out basic research in connection with some specific research themes (e.g. algorithms, application servers and protocols). The platform was expected to result in a "toolbox" containing software, hardware and methods that will be available to all firms interested in developing and commercializing new positioning based products and/or services.

Since the research interest here was companies only, the universities were not included in the empirical study. The organizations selected were the applied research institute (which was responsible for the overall project management), two of the firms in the core partners' group (the two firms that were responsible for research "cases" in the context of the consortium), and one of the firms which expressed interest in future collaboration (the firm that was more actively interested in future collaboration with the core partners). All of them are medium-sized Danish organizations, here called (fictive names): DanInstitute (the applied research institute), SmartSoftware and ictConsult (the two firms from the core group), and SignageSolutions (the firm interested in future collaboration). They can be described as follows: DanInstitute develops research-based technological services for commercial application, and plays a major role in collaborations between universities and companies in Denmark; SmartSoftware supplies software solutions in the area of health care management, positioning, and national intelligence/

security; IctConsult provides specialized advisory services, methods and products in the agricultural sector, and; SignageSolutions is a firm specialized in architectural signage solutions.

3.3 Data collection

With regard to data collection the main source of data for this research were interviews, with documents being a supplementary source of information. Most of the information from the interviews came from managers at middle level, since they were the ones who were mainly involved in the consortium. Some managers also indicated other key informants, so these were included as well. Data were collected from 19 semi-structured interviews (all recorded and transcribed) in the four organizations, between October 2009 and October 2010. The number of interviews was not determined a priori. After a few interviews in each of the organizations, informants were basically providing the same information, which therefore meant that no more interviews would be necessary. The specific number of interviews in each of the companies was: 7 interviews at DanInstitute (with four managers, one of them interviewed twice for a better understanding of commercial aspects of the technology platform; one senior developer and one doctoral student); 4 at SmartSoftware (all with managers); 5 at ictConsult (five managers); 3 at SignageSolutions (with three managers and one senior product designer; one manager was interviewed concomitantly with the senior product designer, due to time restrictions of them). In terms of documents, an important source was the institutional report prepared by the European Space Agency (ESA) about the "Galileo European Programme for Global Navigation Services". Another important source was a description of the technology platform by the partner companies. Other documents analyzed were annual reports from the companies and brochures.

The questions in the interviews were mainly related to three central themes: (1) strategic importance of the emergent technology for the company; (2) main initiatives taken in connection with the adoption of the technology; (3) main challenges the company has faced. First, how important was the Galileo technology for the partner companies in the consortium? Information in institutional reports, as well as the establishment of the consortium per se, were strong signals about the importance of the technology for companies involved, but it was necessary to contact people and to try to understand their points of view. The importance of the technology for managers would give some clue as to its real importance for their companies, and whether their companies were effectively interested in the development of the joint work and in incorporating its results. Next, in order to understand the effect of the initiatives taken on the firms' business models it would be important to know details about the initiatives and the main challenges companies were facing—initiatives and challenges would be useful to identify the occurrence of non-fundamental changes, business model extension or revision, for example.

The interviews did not follow a strict sequence of themes, and the questions were not pre-elaborated, hence the interviews can be considered semi-structured. The interviews took place at the interviewees' workplace (with one exception, for the

convenience of the interviewee), and usually started with the interviewee describing his/her academic background and role in the company. While the approach of asking questions related to the central themes varied from interviewee to interviewee, an effort was made to ask similar questions across participants to enable further comparisons and also to validate information from different sources. All questions were open ended, i.e. interviewees were able to express free opinions, comments and points of view. The duration of the 20 interviews ranged from 23 to 78 min, the average being 55 min. Table 1 contains examples of questions asked during the interviews in connection with the three central themes (adapted for purposes of clarity and concision), company by company. This table was developed a posteriori, during data analysis, when the question was identified in respect to one of the three central themes.

3.4 Data analysis and main findings

Analysis of the data was mostly guided by a specific search for answers (which characterizes a more deductive approach), for the purpose of grouping them into one of the three central themes previously mentioned. It was not necessary to use a specific software tool for data analysis, since the relatively small number of interviews and also taking into account that mapping details from the interviewees' answers would not be necessary. Thus, the interviews were carefully read to search for specific answers that could be grouped into one of the three central themes. Triangulation of data mainly consisted of comparing information collected from interviewees (primary data) with information from the institutional report about the Galileo Programme and from the document prepared by the partner companies about the Galileo platform (secondary data). Table 2 contains some representative data (also adapted for purposes of clarity and concision) collected from different interviews in the four organizations, organized by central themes in order to enable cross-firm comparison.

Executives in all the organizations consider the emergent positioning technology to be relevant to their commercial activities (if not now, in the near future) and recognize that it may lead to innovative commercial opportunities. The core partners expressed that their companies are genuinely interested in adopting the technology, and for this reason decided to be part of the joint work. They have adopted some common initiatives, such as assigning representatives to attend steering committee meetings. Each of the companies has also adopted some specific initiatives. DanInstitute was responsible for contacting universities and firms in Denmark to explain the technology platform idea and to interest them in joining the work (the DanInstitute plays a major role in establishing a link between universities and industries), and it is also carrying out basic research with the partners in the consortium. SmartSoftware selected the research "case" of indoor positioning of people in emergency situations to investigate in the context of the consortium and have carried out "brainstorming" sections about commercial possibilities using the Galileo technology. Managers there consider the moment too early to take further initiatives, though. ictConsult contacted its customers to understand their needs and selected the "case" of indoor positioning of animals for research in the context of

Table 1 Examples of questions asked during interviews

Company	Importance of the technology	Initiatives taken	Main challenges
DanInstitute	Is Galileo just one more project? (DI1) What does it mean for DanInstitute, is it just a new project or something disruptive? (DI2) How big a step is Galileo? (DI3) What does Galileo technology mean for DanInstitute? (DI4)	How have you selected the collaborating companies for the Galileo project? (DI2) Can you describe the collaboration that DanInstitute has with companies? (DI5)	What difficulties has DanInstitute had? (DI1) What are the main difficulties or obstacles you are facing? (DI2) Can you describe some of the main difficulties that you have faced when dealing with Galileo technology in the context of the platform? (DI3)
SmartSoftware	Do you think that Galileo technology is just one more technological possibility among others? (Sma1) Is Galileo special, or could you also have done your project with GPS? (Sma2) Do you think that Galileo technology has the potential to bring something different to the company? (Sma3) What is the advantage of Galileo? (Sma4)	What did you do to prepare for Galileo? What activities have you already carried out to respond to this new opportunity? (Sma1) What did you do to find something that resulted in this research "case"? (Sma2) How do you find new business cases? (Sma3) Have you also developed products based on Galileo? (Sma3)	What do you thing the main challenges will be? (Sma1) Is the uncertainty about when Galileo will become available a problem for the project? (Sma3) Are these problems mostly technical challenges? (Sma3) Are there other, non-technical problems? (Sma3)
IctConsult	If Galileo is not going to be cheap, will it be worthwhile? (ict1) Is Galileo a big jump? Is it new? (ict4) Is it a big step compared with GPS? (ict4)	How did the idea for the research "case" come about? (ict1) Since you are still doing basic research, is it possible to have a clear idea of when you will have an application to use? (ict3) How about the focus group interviews? How did they begin? (ict5)	What are the main difficulties that you face in this research? (ict2) What is the biggest difficulty in the process of carrying out research into Galileo? (ict3)
SignageSolutions	Is the Galileo technology a major step or could you easily live without it? (Sig1) Do you really believe in the potential of Galileo, or can other technologies be used for the same purposes? (Sig3)	What have you done so far? (Sig2) Is there a clear project? (Sig2)	Is it difficult for people in the company to understand this new way of working? (Sig1)

Questions were adapted and shortened for purposes of clarity and concision; abbreviations at the end of questions indicate the company and the interviewee

Table 2 Representative data from the interviewees' answers

Company	Importance of the technology	Initiatives taken	Main challenges
DanInstitute	"Even if the indoor function does not work precisely as expected, it can be used in combination with other technologies to do more precise indoor positioning" (DI1) "Galileo will play an important role in the future, not now" (DI2) "Galileo pushes other technologies; Galileo is also about being one more supporting system" (DI3)	"Application for a funded-based project, because companies are not interested in taking responsibility for the idea" (DI2) "Contacting companies for potential future collaboration" (DI2) "It is usually the DanInstitute that initiates a network contact with partners" (DI5)	"The culture is more university than company; people think more in technology than in business and market; the biggest change is cultural change" (DI1) "The technology is not available yet; it has not been defined yet: who is going to run the infrastructure, who is going to earn money from Galileo" (DI2) "Technology developers should spend more time with business developers" (DI4)
SmartSoftware	"There are a lot of perspectives of using Galileo within the business area" (Sma1) "Galileo will be one more possibility of going abroad; positioning technology is of huge importance for the company" (Sma2) "Galileo is important for the company because it involves networking with other companies" (Sma3) "It would be important if it could give indoor positioning"(Sma4)	"There have been prototypes, demos, small brainstorming in-house to see what the technology could be used for—but not any structured approach yet" (Sma1) "Thinking about the possibilities, but no final decision has been made yet" (Sma2) "A lot of brainstorming about different situations, customers, and markets for Galileo" (Sma3) "The main initiative is in regard to the research area of the consortium; it is still too early"(Sma4)	"The technology needs to be more mature before it is ready for use" (Sma1) "Uncertainty in regard to this new technology: you do not know when it is going to be available" (Sma2) "There have been no tests to see whether the technology will work" "It is still emerging, and of course you have to find some business cases, and some customers that could be interested" (Sma3)
IctConsult	"Galileo provides the possibility of a whole new way of observing and tracking" (ict1) "In the long term, it can increase customers' earnings and productivity" (ict3) "Satellite systems will become more and more important; the project is also a common build-up of knowledge and understanding; Galileo is really important for the organization" (ict4)	"It is long-term research" (ict3, p. 1) "The plant case, which is low-risk, represents 20 % of the investment of the company; the cattle case, which is more high-risk, represents 80 % of the investment" (ict1) "Focus group interviewing is just one of the things we have done; we have carried out qualitative interviews" (ict5)	"The most difficult thing is the last part of the innovation—or to get any business out of it" (ict2) "Technical aspects and uncertainty about how well the technology will work" (ict3) "There are hard technical problems to solve in regard to the technology" (ict4)

Table 2 continued

Company	Importance of the technology	Initiatives taken	Main challenges
SignageSolutions	"Currently, the Galileo technology is not important for the company, but in the future it might be important" (Sig1) "The main interest of the company was that it would be functional indoors; right now, from a maturity perspective of the technology, there is another positioning technology that would be more interesting" (Sig4)	"The company has had brainstorming sessions for ideas"; "Presentation of a project idea for DanInstitute"; "Development of a business plan, together with DanInstitute"; "Currently, the company is investigating the commercial perspectives, looking at technological alternatives" (Sig2)	"People in the company do not understand the need to change" (Sig1) "It is a very traditional organization" (Sig3)

Questions were adapted and shortened for purposes of clarity and concision; abbreviations at the end of questions indicate the company and the interviewee

the consortium. SignageSolutions is not a core partner in the consortium, and has therefore not defined a specific "case" to work within the context of the consortium. The company's strategy is to buy technological solutions in the market. Table 3 presents details about the findings, in accordance with the importance of the technology for each of the companies, the main initiatives they have taken and challenges faced.

4 Identification of a "pre-stage" using the theoretical framework

After classifying the data in accordance with the three central themes, it was necessary to understand how the initiatives taken in connection with adopting the emergent technology had affected the business models of firms. This was done by using the data collected and the framework guiding the research. The framework distinguishes between initiatives that do not affect the core repeated processes of firms (they are "non-fundamental" changes), and initiatives that do affect (by creating, extending, revising or abolishing core processes), and suggests that there are challenges of different nature involved in business model change. The interpretation of whether the initiatives taken affected or not the core repeated processes of firms is described here.

The three companies considered Galileo an important technology, and they were effectively taking several initiatives in connection with Galileo, as described in Table 1. Nevertheless, none of the initiatives the companies have taken match the types of business model change that Cavalcante et al.'s (2011) framework describes. For example, no business model creation occurred, since companies have not moved from "ideas" to "practice", that is, the creation of new core repeated processes using the technology for commercial purposes. Companies are trying new practices, such as carrying out a joint work, but this presents an experimental and temporary character, and there is no guarantee that firms will continue performing such practices over the long term, i.e. as an intrinsic characteristic of their way of doing

Table 3 Summary of the main findings

Company	Importance of the technology	Initiatives taken	Main challenges
DanInstitute	Positioning technologies as a whole are very important to DanInstitute. Galileo is one among other positioning technologies, and it is also about being a supporting system. Galileo will play an important role in the future, not now. Even if the indoor function does not work precisely as expected, it will be used in combination with other technologies to do more precise indoor positioning	Some of the first initiatives include contacting companies about joining the Galileo consortium and writing and preparing applications for funding at national level. Galileo involves risks, and no private company can afford it alone. DanInstitute is also carrying out basic research with the partners in the consortium, because it is interested in the commercialization of technologies in the near future	The biggest difficulty is cultural change: the culture is more university- than company-oriented. In relation to the actual technology, there are technical problems and uncertainty about its future. Another challenge is that technology developers should spend more time with business developers
SmartSoftware	Positioning technology is of great importance to the company. There are a lot of perspectives involved in using Galileo in the company's products. It would be very important if Galileo could be used for indoor positioning. At this stage, however, Galileo is a bit too far on the horizon for the customers. Galileo is also important because it involves networking with other companies	The main initiative is about the research area of the consortium: the company selected the "case" of indoor positioning of people in emergency situations. There have been "brainstorming" about possible commercial situations (customers and markets in connection with Galileo), although this did not follow a structured approach and no final decision has been made yet. It is still too early for the company to take further initiatives	Some challenges are: uncertainty about this new technology; no proof that the technology will work; the company does not know yet what exactly to expect from Galileo; the technology is still in its infancy, thus it is difficult to find business cases and potential customers
IctConsult	The company considers that satellite navigation will become more and more important, and that indoor positioning will offer the possibility of a new way of observing and tracking. Galileo can contribute to increasing customers' productivity and earnings. The project represents a building up of knowledge and understanding between companies and universities	After conducting a focus group study and interviews with customers to understand their needs, the company selected the "case" of indoor positioning of animals for research in the context of the Galileo Platform. The company considers that this is a long-term research project	There are difficulties in connection with technical aspects and uncertainty about how well the technology will work, but the company believes that the technology will succeed and change the way the company does business over the long term

Table 3 continued

Company	Importance of the technology	Initiatives taken	Main challenges
SignageSolutions	Currently, Galileo technology is not important for the company, but it might be in the future. The company's main interest is that the technology functions in an indoor environment. From a maturity perspective of the technology, there is another positioning technology that the company is investigating, and this would be more interesting	The main initiatives the company has taken include: presentation of a project idea to DanInstitute for an application for public funding; development of a business plan, under the guidance of the DanInstitute; exchange of knowledge about the technology and analysis of its commercial perspective, and; brainstorming sessions in–house for commercial ideas	The biggest challenge is the culture of the organization. It is a very traditional organization and people in the company do not understand the need to change. Employees do not understand the company's strategic choice, i.e. to buy software elsewhere rather than to develop it in-house

business. The main characteristics of business model extension are refinement and improvements, but so far there have not been any improvements in the products/services that the companies offer, and the main reason for this is that the technology is not available yet. Managers are still thinking about how the new technology could improve current products/services. There has been no business model revision, either, since companies have not replaced current practices by new ones—companies are still doing business in the same way and offering the same products/services. In short, so far organizations' core repeated processes are still the same. This investigation revealed that companies are still in the early phase of experimenting and learning new ideas and practices in connection with the emergent technology.

It is clear that the initiatives have not yet affected the firms' business models. However, it seems inadequate to claim that the activities related to experimenting and learning are simply changes that do not affect the business models of firms, as the theoretical framework suggests. It is necessary to acknowledge the potential of these initiatives to affect the business model afterwards, when the technology effectively becomes available. The framework is clear in the sense of distinguishing between initiatives that affect a firms' business model from initiatives that do not, but this investigation reveals that there might be an intermediary stage before effective business model change, with challenges of different nature to overcome during this stage. Figure 2 illustrates what might is referable as a "pre-stage" of potential business model change.

"Experimentation" in Fig. 2 means: (1) researching the technical challenges in connection with the emergent technology and giving demonstrations/making prototypes; and (2) performing new practices, e.g. collaborating in the joint project (the researchers' meetings and the managerial meetings at the steering committee represent new practices for the companies involved). "Learning" refers to aspects

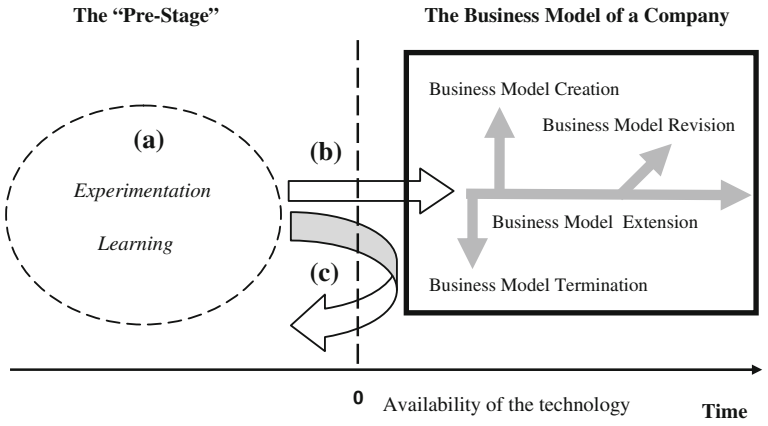

Fig. 2 Emergent technologies and the "pre-stage" of potential business model change. *Notes*: *(a)* challenges during the "pre-stage", *(b)* overcoming the challenges and being able to promote business model change, *(c)* the impossibility to make business model change: "non-fundamental" changes. *Source* author's elaboration, based on Cavalcante et al. (2011)

such as: (1) acquiring new knowledge in connection with the technical aspects of the emergent technology; (2) discussing new ideas on possible commercial opportunities for the companies; (3) interacting and contacting, i.e. networking with the other partners in the project.

"Experimenting" and "learning" means dealing with new ideas and practices, and constitute the main aspects of the "pre-stage" of potential business model change. Of course, not all these initiatives are unproblematic: companies face different challenges, including unavailability of the technology and the uncertainty surrounding it. The challenges that companies face in the pre-stage appear in Fig. 2 as "(a)". While experimentation and learning in the pre-stage might affect the core processes of the companies in the future, there is also the possibility that they might not lead to any type of business model change at all. A company that can overcome the challenges in the pre-stage will be able to implement business model change (represented by "(b)" in Fig. 2) by the time the new technology becomes available (or soon after). However, companies which, for different reasons, cannot overcome the challenges, will be unable to implement business model change (represented by "(c)" in Fig. 2), even when the technology becomes available—in this situation, i.e. when initiatives do not lead to effective business model change, they can be considered as "non-fundamental" changes.

5 Discussion

In Cavalcante et al.'s (2011) framework, business model change occurs when individuals implement ideas, affecting the firm's core repeated processes. One could imagine that, before the business model changes, only ideas exist. However, the identification of a pre-stage indicates that not only ideas, but a whole set of activities can take place, even before companies start promoting business model change. The

focus of discussion in the following sections is on experimentation and learning, which, in accordance with the empirical findings, are the main aspects that characterize the pre-stage. The concluding section of the discussion points out the importance to move from the pre-stage to effective business model change.

5.1 Experimentation

Although the importance of experimentation has long been mentioned in organizational studies, the link between experimentation and business models has only recently been suggested (mainly in connection with the situated perspective of business model change). For example, McGrath (2010) argues that discovering new business models requires experimentation, while Sosna et al. (2010) describe different stages in the development of a firm's business model, characterized by a process of trial-and-error. According to Sosna et al. (2010), initial exploration of the "best" business model takes place during the first years of the company, followed by the exploitation phase, when a viable business model emerges and continuous trail-and-error still take place, but without changing the core logic of the firm. One important aspect to note, however, is that the empirical study with the emergent global positioning technology reveals that, in established companies, experimental activities do not always affect a company's business model, since to do this they must also affect the firm's core repeated processes. The case-companies have performed temporary new activities in order to learn more about the Galileo technology and its market potential. These new activities are linked to the firms through a large number of people and formalized reporting structures—but the business models of the firms remain intact.

Chesbrough (2010) argues that it is important to construct maps of business models by identifying/visualizing the processes underlying them and trying alternative combinations of them. This means that experimentation should not be limited to new techniques or practices, but can also refer to experimenting with completely new business models. Christensen (1997) has advocated allocating innovative projects (which demand experimenting with new business models) outside the company's structure. In this way, the core repeated processes of a company are not affected. This is what is happening in the case-companies, which have performed new activities related to their innovation projects outside the context of the firms' business models. The researchers' meetings and the managerial meetings at the steering committee, for example, represent new practices for the companies involved, but they take place in specific days and places, and are not mixed with the everyday activities of firms (mainly because of the temporary nature of the consortium and the experimental character of the projects).

MacInnes (2005) argues that it is necessary to take account of the different stages in the evolution of a new technology and the obstacles to overcome accordingly, pointing out technical problems in the first stage. The empirical investigation of the emergent technology showed that, while the interviewees mentioned technical challenges as being the most common, other challenges deserve as much attention as the technical ones. The case of SignageSolutions is illustrative, characterized by a conservative culture. Company's managers must deal with organizational culture

issues and be able to find solutions that will make the company ready for business model change. Managers at DanInstitute mentioned the challenge of commercializing products (DanInstitute's personnel have a more academic background). Managers there plan to slowly make its personnel more familiar with the commercial aspects of businesses.

5.2 Learning

In business activities, careful analysis of situations is as important as learning through situated practices. Continuous learning through situated practices often lead to incremental improvements, since people in companies adjust to new situations, maintaining the core working logic of the business intact. This is in line with Feldman's (2000) suggestion that, although change takes place during the performance of routines, they are still the same routines. This adjustment process is fundamentally different from changes that might occur after a pre-stage, when new directions are possible, as in the case of business model revision and business model creation. Whereas SmartSoftware, for example, is interested in developing software application related to indoor positioning of people in emergency life-threatening situations (such as people in need of urgent rescue from a building on fire) that will represent an improvement of previous versions of similar commercial applications (i.e. business model extension), SignageSolutions carefully analyzes possible new directions using the emergent technology, which might lead to completely new ways of doing business (i.e. business model revision). The technology platform that the partner companies in the consortium are developing represents an opportunity for the creation of a new business model (i.e. business model creation), collaborative-based.

In Svejenova et al.'s (2010) study on the trajectory of a restaurant entrepreneur, they refer to the period when the entrepreneur was just an employee as a "pre-stage" in the development of the restaurant's business model, arguing that the prior knowledge of individuals is of fundamental importance in a new venture. Change on mental models of individuals is part of the learning process of individuals in the pre-stage of potential business model change. Interviewees' cognition is changing slowly, in line with their increasing understanding of the technical aspects of the emerging technology and its different commercial possibilities. During a "pre-stage", individuals should "train" cognition change, which would entail ongoing abstraction of such aspects as: (1) what the company's business is really about; (2) what the company's core repeated processes are (or business model mapping, as suggested by Chesbrough 2010), and; (3) challenges in connection with each type of business model change. In this way, companies would be taking the first steps towards recognizing and integrating the role of individuals in business model change.

Demil and Lecocq (2010) argue that managers' decisions are antecedents of business model change. This can clearly be seen with the pre-stage of potential business model change: during the pre-stage, managers are learning and experimenting with new practices, and after the pre-stage they will have to make

a decision with regard to which direction to follow. When the emergent technology becomes available, managers will have to decide how their companies will commercialize the technology and which types of changes need to be made in the companies' business models.

Table 4 summarizes the main insights gained from the pre-stage finding.

5.3 Moving from the pre-stage to effective business model change

According to Eisenhardt and Martin (2000), dynamic capabilities are specific organizational processes designed to create value for firms. In this sense, the pre-stage of potential business model change can be of considerable value when associated with firms' innovation activities. This research revealed that the pre-stage represents an excellent opportunity for the creation and development of specific organizational processes to help the company effectively implement the intended type of business model change. During the pre-stage, managers need to support the creation and development of new, specific core processes that will lead to the particular type of business model change they want—although experimenting and learning are important for organizations, companies should go a step further and effectively implement business model change.

As the empirical research reveals, it is during the pre-stage that managers need to overcome the different challenges which occur: technological problems and uncertainty (which affect all organizations), conflicting views between managers and employees (as in the case of SignageSolutions), lack of the requisite skills (DanInstitute), and a shortage of financial resources (affects all organizations). The pre-stage differs from company to company, but it is during this stage that companies are able to experiment with new processes that can be further integrated into their core repeated processes, and take account of the challenges to overcome at both the individual and organizational levels. As Meyer and Stensaker (2006) suggest, this learning period is an opportunity for the firm to develop its capacity to change while at the same time maintaining its stability. Continuous and multiply experimental and learning practices pervading the whole organization can transform the firm into a permanent learning laboratory, fostering the dynamics of the firm's business model over the long term.

As suggested in this research, business model change encompasses both the abstract and the performative levels (which correspond to the analytical and situated perspectives, respectively). They are closely linked to one another, and, while it is necessary to reconcile them, it is also important to differentiate between them. Figure 3 illustrates business model change at the abstract level, when individuals should understand the firm's business model and imagine how it might be in the future. Business model change at the performative level involves a pre-stage period in which it is necessary to develop the firm's capacity to change, in accordance with the type of business model change intended. This is followed by the effective implementation of the chosen one (i.e. business model creation, extension, revision or termination).

Table 4 Insights gained from the "pre-stage" finding

Previous related ideas	Insights
Business model change takes place when individuals' ideas are implemented, affecting a firm's core repeated processes (Cavalcante et al. 2011)	There is a "pre-stage" of potential business model change in which a whole set of activities can take place
New business models require a process of trial-and-error experimentation and learning (McGrath 2010; Svejenova et al. 2010)	Trial-and-error experimentation does not always affect a business model
Technical problems are those that require most attention in the emergence of a new technology (MacInnes 2005)	In the "pre-stage" of potential business model change, other problems deserve as much attention as the technical ones
Individuals are aware of the organizational context in which they are involved and try to adjust/adapt their everyday repeated activities while performing them (Feldman 2000)	Whereas continuous changes in the performance of organizational processes often lead to incremental improvements in them, after a "pre-stage", among other things, a revision of the core working logic of a business is also possible
Prior knowledge of individuals is of fundamental importance in entrepreneurial activities (Svejenova et al.'s 2010)	Change on mental models is part of the learning process of individuals in the "pre-stage" of potential business model change
The decision to change should be considered an internal factor antecedent to business model change (Demil and Lecocq 2010)	With the "pre-stage", one can clearly see that the decision to change is an antecedent aspect of business model change

6 Conclusion

The continuous progress of science requires the developing and testing of theories. Since research on business model change is still in its infancy, it is important to use existing theoretical frameworks in empirical studies in order to improve and consolidate the constructs that emerge and that will form the basis of a theory on business model change. The theoretical framework used in this study was helpful in understanding how change initiatives affect a firm's business model and in integrating two distinct perspectives on business model change. However, it was not possible to classify the initiatives taken during the emergence of a new technology (situated practices) in accordance with one of the four types of business model change (formal analysis). The research result was therefore that it would be necessary to identify a new construct to accommodate the findings. The pre-stage is a new empirical-based construct that suggests that there might be an intermediary step before effective business model change. However, this study focused on four Danish small-medium sized organizations. Thus, the research was limited in terms of the number of companies, size and context. A larger number of companies could possibly have contributed to describe better the pre-stage phenomenon.

Different implications for corporate practice can be mentioned. First, business model change deserves attention from managers. Managers most often focus on the development of innovative products and/or services, and forget that innovation also involves the firm's business model. The second implication is that new activities do not necessarily mean business model change—many new activities are part of the

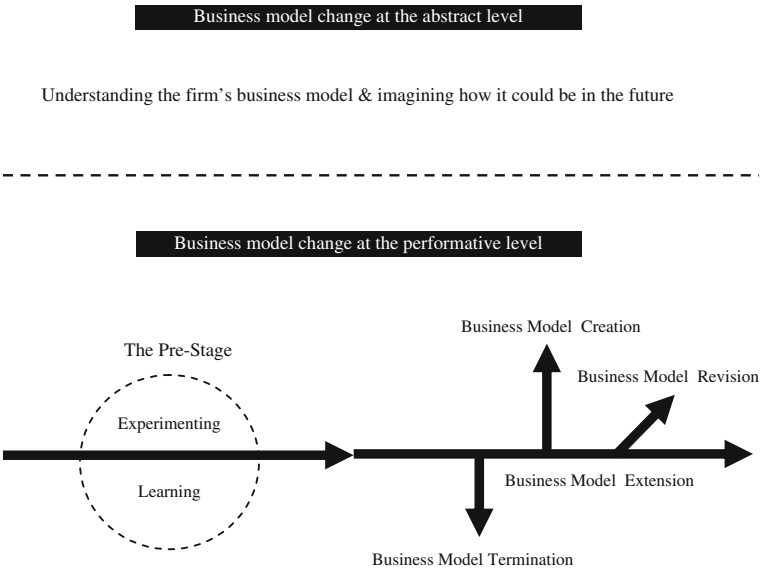

Fig. 3 Business model change at the abstract and the performative levels. *Source* author's elaboration, based on Cavalcante et al. (2011)

pre-stage of business model change. Third, the pre-stage finding reveals different challenges to overcome in order to business model change effectively take place, not only at the organizational level, but also at the level of individuals. Many business opportunities might be lost because managers are unable to overcome the different challenges. Fourth, in most cases, the pre-stage is likely to happen often in companies, in multiple situations and at different hierarchical levels, and it is not likely to last long, since companies are progressively being involved in a fast-changing environment. Managers need to be able to act quickly based on governance mechanisms, so that new business opportunities are not lost due to late initiatives.

There are several avenues for further research. First, more research is needed into the pre-stage finding in different settings, in order to describe it in more details. Second, a promising research field is the use of the business model perspective to foresee technological impact. This perspective can be helpful in understanding how a new technology will affect an organization internally. And which tools/instruments could companies use during the pre-stage for a detailed analysis of the impact of change initiatives on a firm's business model? The use of appropriate analytical tools/instruments would facilitate the creation and development of new, specific core processes. These are research fields in waiting.

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