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## **Business Models Tooling and a Research Agenda**

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### **Abstract**

*During the Bled conferences, Business Models have attracted a lot of attention. The discussion has moved from understanding the core concepts towards designing and implementing business models. Business models have become a common topic, with concepts and approaches becoming main stream, and connected to more generic research approaches and design perspectives, and business model tooling is becoming more important. In this paper, we provide examples of tooling with regard to Business Model road-mapping, Business Model stress-testing, Business models and Agile software development, and Business models and financial tooling. We also illustrate future research by combining Business Model analysis with Enterprise Architecture. The aim of this paper is to show how business model research is*

*complemented by tooling and to develop an outlook for a research agenda that may be relevant to participants to the Bled conference.*

**Keywords:** Business Models, tooling, scenarios, roadmaps, agile, financial arrangements, enterprise architectures

## **1. Introduction**

The concept of business model (BM) was first introduced in 1975, in process and data modeling/Information management literature. In 1990, there were seven publications on BMs in the ABI-Inform database. In 2000, the term BM yielded 600 hits in Google, and in 2010 this has increased to 102 million hits. Also, in academic literature, the concept of BM has received enormous attention.

During the Bled conference, the presentation of Paul Timmer on BMs in 2001 at the 14<sup>th</sup> Bled Conference, based on the paper published in *Electronic Markets* in 1998 had particularly a tremendous impact. His presentation, paper and book (1999) helped define the research topic that has been on the Bled agenda for many years. However he was not the first to address Business Models as a topic. This honor has to be reserved for Yves Pigneur who addressed the topic of Business Value framework together with Michel Bloch and Arie Segev in a paper entitled 'Leveraging Electronic Commerce for Competitive Advantage: a Business Value Framework' in 1996 at the 9<sup>th</sup> Bled Conference (Bloch et al. 1996). Also Giaglis & Paul (1998) on dynamic modeling was one of the early contributions to the discussion on business modeling and value.

In 2000, we were involved in a study commissioned by the Ministry of Economic Affairs in the Netherlands, entitled 'E-commerce: BMs Return to the Bottomline' (Holland et al., 2000), in which we stated that, contrary to the common opinion at that time, the Internet would not lead to new economic laws. BMs in the Internet era follow the laws of information economics (see, for instance, Shapiro & Varian, 1999). The common assumption that the emergence of the Internet led to new economic laws (Kelly, 1999) proved to be incorrect. Since then, our research focus has shifted several times, from the initial focus on eCommerce, metrics and BMs, towards the conceptualization of BMs. The discussion of the relationship between strategy and BMs yielded the insight that BMs are a way to implement business strategy.

In 2002, Osterwalder and Pigneur (2002) established BMs as a core topic to be discussed during Bled. Definition of the BM concept, analyzes of constituting elements, typologies, and applications of BM in different domains attracted a lot of attention at Bled, for instance Pateli & Giaglis (2003) on conceptualization, typologies and conceptual framing of BMs, and by Lambert (2006 and 2008) on conceptualization. Since 2002, BMs have been a recurring theme. The work of Osterwalder and Pigneur led to the Business Model Canvas (Osterwalder &

Pigneur, 2002 Osterwalder & Pigneur, 2003; Gordijn, Osterwalder & Pigneur, 2005), Gordijns (Gordijn, 2003; Kartseva, Gordijn, & Akkermans, 2003; Baida, Gordijn, Morch & Saele, 2004; Kartseva, Tan & Gordijn, 2004; Pijpers & Gordijn, 2007; Pijpers, Gordijn & Akkermans, 2009). ,) work was centered around the e3Value framework, Ballon (2004, 2007, 2009) focused on critical control points , and our research focused on the STOF (Service, Technology, Organizational and Finance) model (Bouwman, 2003; Faber, Ballon, Bouwman, Haaker, Rietkerk & Steen, 2003; Faber, Bouwman, & Haaker, 2004; De Reuver, Bouwman, & Haaker, 2007; De Reuver, Bouwman & Haaker, 2008).

The focus with regard to BMs has shifted from a conceptual and theoretical focus to tooling and practical usability. Therefore, we focus in this contribution on BM tooling and will outline a research agenda related to tooling. We focus on (1) BM road mapping, (2) BM stress testing, (3) BM and agile software development, and (4) financial tooling in a networked environment. We also address the relationship between BM and business modeling focusing on value and information exchange, with an insight into process modeling. We begin by introducing the relevant concepts, after which we present the approaches including illustrative cases.

## **2. Business Models and Tooling**

Business models as a concept are typically used to explicate how companies create and capture value from technological innovation (Chesbrough & Rosenbloom, 2002). While most managers focused on strategic positioning in stable value chains until the 1990s, the breakthrough of Internet technologies necessitated companies to rethink and even reinvent their internal business logic. There is a clear difference in how American and European scholars approach the concept of a BM. The American school initially focuses mainly on the classification of BMs into specific sectors (Afuah & Tucci, 2001; Rappa, 2000), but also on their use in a context of open innovation (Chesbrough, 2007; 2010). Recently, the relationship with strategy and revenue models has been discussed more explicitly, for instance in Long Range Planning (Long Range Planning, 2010). Interestingly, this special issue illustrates that the strategic management literature ignores IS literature on BMs, despite the latter having a far longer conceptual tradition. The focus in strategic management is on how strategies are implemented in Business Models. Meanwhile, the school on BM, originating from Information Systems, is focused more on design approaches and ontologies, and , therefore, appears to be better equipped to propose BM tooling. , We highlight some of the main properties of four BM design approaches that dominate information systems BM school, i.e. Osterwalder's CANVAS approach, the approach in Ballon (2004, 2007, 2009) focusing on key design parameters, Gordijn's value model (Gordijn & Akkermans, 2001) and our own approach, i.e. the STOF model (Bouwman et al, 2008).

*Business model CANVAS* is a popular tool that allows practitioners to design BMs in a creative session (Osterwalder & Pigneur, 2002), based on a detailed conceptual model in which various design variables in different domains are included. A strength, but also a limitation, of the BM

CANVAS is that it focuses on individual companies. As such, the approach is less usable for those interested in eco-systems around a service concept. Moreover, the BM canvas provides little detail with regard to the design variables and leaves much room for interpretation. Some practical tooling is available as an app that runs on tablets.

Ballon's BM approach (2009) focuses mainly on classifying BMs in taxonomies. He argues that a classification of BMs should be based on a set of key design parameters and a limited set of options per parameter. He proposes four levels of (mobile) services BMs in which design parameters can be found. These levels are:

- value network level, comprising the specific combination of assets, the level of vertical integration, and customer ownership;
- functional model level, comprising the modules and interfaces between models, distribution of intelligence within the system, and the interoperability with other systems;
- financial model level, comprising the cost (sharing) model, revenue model, and revenue sharing model; and
- value proposition level, comprising positioning, user involvement and intended value.

For each of these parameters, Ballon identifies the two main options that require a trade-off and that can be used to classify BMs. Although Ballon's approach appears useful when it comes to analyzing BMs at a high level of abstraction, is it less useful as a design approach, because it does not provide practical guidelines on how to design and develop BMs. The classification constrains the richness of potential BMs under study and may even lead to false dilemmas.

*Gordijn's E3-value methodology* is especially useful for modeling the economic and financial aspects of BMs (Gordijn & Akkermans, 2001). E3 models the value flows within a value network and simulates and computes the business cases for each of the partners in the network. While doing so, various scenarios can be modeled. A paper using Gordijn's approach has been awarded the Bled Best Paper award (Baida, et al, 2007). E3-value is especially useful when combined with quantitative scenario analysis, in which the future scenarios can be described in a detailed manner, as well as modeling process flows. A 2005 Bled paper (Janssen et al., 2005) related the quantitative assessment capabilities of E3Value to ArchiMate, an enterprise architecture language (Lankhorst, 2009) . This made it possible to move from value models to implementation models.

The STOF method provides a more detailed and elaborated way of dealing with design issues and success factors for BMs, and specifies stages of quick scan and more elaborate design and validation steps (Bouwman, et al., 2008; Faber & de Vos, 2008). The STOF method describes the interdependencies between the four core domains, i.e. service, technology, organization and finance, as well as a detailed description of each domain and the interdependencies of critical design issues per and between domains. StOf is a rigorous method that lists a

predefined set of design variables. A paper focused on designing navigation service bundles also was awarded the Bled Best Paper award (Haaker, et al. 2006). The STOF method is less strict than, for instance, Ballon's (2007) approach, as the answer to each design variable is more or less open rather than restricted to a set of predefined options. Although we kept our eye on the more general discussion on BMs, and specifically BM dynamics, our research increasingly focused on mobile services and BMs, and on design more than on conceptual models. In 2008, our research resulted in the book *Mobile Service Innovation and Business Models* (Bouwman et al., 2008) and a manual for designing BMs (Faber & De Vos, 2008). Despite our focus on *mobile* services and methods for supporting *mobile* service concept definitions with a well-designed BM, we saw that the STOF concepts and design methodology were adopted within a broader domain than the mobile industry alone, and by academia as well as industry.

Our approach differs from the CANVAS model (Osterwalder and Pigneur, 2010) in the following respects. First of all, we start from a design focus on ICT-enabled services and from there, we determine which technical architecture is required, as well as which organizational and financial resources and capabilities are needed. Secondly, the unit of analysis is the service (or service bundle) and not the individual firm. We look into the value networks (or eco-systems) that have to enable the service, and into the BMs of every individual organization involved in the eco-system. Thirdly, we are more focused on tooling, while CANVAS is more focused on strategic management and marketing.

When using the STOF model, or CANVAS for that matter, in brainstorming sessions, we are confronted with very practical questions, like how to apply the rather abstract BM approaches in practice, how to move from the existing BM to the desired one, how to implement the abstract BMs ideas in an inter-organizational setting and how to connect the BM to exiting business and enterprise architectures, information management and IT architectures, and finally how decisions on the financials of BMs could be supported.

Tooling based on the STOF model is progressing in four directions. First of all, the STOF tooling enables the analysis of strategic transitions of firms from product to service provider (servitization), from a single product or service to service and product/service bundles, and from a specific set of services to more value added services, for instance moving from access provider to platform or bundled service provider in a specific sector, for example ambient living, health care or security. Alternative BMs for ICT-enabled services can be designed using a road-mapping approach we will discuss in greater detail.

The second direction in which we develop BM tooling is focused on BM stress-testing, which provides a way of testing the robustness of a BM against various scenarios in future markets, taking changes in technology and regulation in account. The stress testing approach combines scenario analysis with BM concepts.

The third direction, which is more practical in nature, focuses on how BM analysis can be combined with agile software development. A fourth direction for BM tooling is aimed at developing decision support tools for designing and analyzing BM alternatives, with a special emphasis on service bundling, marketing and pricing issues. This last line of tooling is focused more on finance and on sharing revenues and risks.

Below, we discuss these four tooling directions in greater detail. We also address bridging the gap between the generic and holistic BMs on the one hand, and process modeling and value exchange approaches on the other. At a conceptual level, an extension of the STOF in the direction of Value, Information and Process modeling (VIP) is explored. A connection to existing modeling approaches, for instance in the field of Business and Enterprise architecture and in the process modeling domain, still needs to be made. Although these modeling approaches are widely available to individual companies, inter-organizational process modeling is largely missing.

### **3. Business Model Road-Mapping**

Designing and testing a new BM is challenging in itself, but how to make the transition to new BMs? When to start investing in new technologies? When to attract new (types of) employees who are capable of dealing with new services? Until when to postpone decisions to see how the market is developing, and what are points of no return? These types of issues are dealt with in a BM roadmap, which is a plan with intermediate steps designed to realize a desired BM, starting from an existing BM, describing the intermediate steps and critical decisions.

#### **1.1 Business road-mapping concepts**

BM road-mapping is carried out at two levels of analysis: the BM itself, and the activities needed to enable changes in the BM. The first layer consists of the changes that are made to realize the new BM, within each of the four domains of the STOF model, and may include launching a new service, implementing a new technology, involving a new partner, or changing the tariff structure. In addition, this layer also involves BM domains that are affected by the changes. For example, the decision to implement a new technology may impact the service offering and/or the cost structure of a service. Therefore, the question should be what new technological, organizational or financial arrangements are needed to bring about the desired change in the BM? The second layer involves the activities that are needed to realize the changes in the BM domains. In most cases, an organization or value network may not have access to all the resources and capabilities they require. Moreover, existing resources and capabilities may become obsolete. The translation towards the activity level can be made by determining which activity needs to be carried out to enable the desired BM changes. Several activities can be taken into account at this level of analysis: technology development, partnership formation, including the selection, negotiation and setting up of the governance

structure, and making or attracting investments. Although a BM domain that needs to be changed can focus on one of the STOF domains , it can have impact on all. (See Table 1).

## 1.2 Business road-mapping process

The process of BM road-mapping does not require a detailed design of the desired BM. Rather, the analysis of how the current BM should be changed to enable a desired BM in the future is an intrinsic part of the method. The four steps for BM road-mapping are:

- (1) Identifying desired change. What should the BM look like in a few years' time? In this step, the ultimate ambition for the BM is defined. For example, an organization may desire to become a service provider rather than a manufacturer, or a service provider may wish to start offering new types of services on top of its existing portfolio.
- (2) Analyzing the impact of the desired changes on other domains, and deciding which other components need to be changed to realize the intended change, by determining what new resources and capabilities are required.
- (3) Translating BM changes into specific activities. New resources and capabilities can be acquired internally or externally. This step may also involve terminating existing resources and capabilities. In addition, an assessment is made of the impact these choices have on the value network: which relationships have to be formed, terminated or altered?
- (4) Back-casting the ideal transition path and mapping the actions onto a roadmap that can be visualized in a graph defining the relationship between the actions. One of the relevant questions is whether a change or activity creates path dependencies or not. For each of the changes and activities, an analysis has to be made as to how critical they are: Are they irreversible? Are they necessarily followed by activities that require large investments? Which choices still leave room to go back to the original BM or an alternative BM?

Layer in a BM roadmap	Definition	Key question	Examples
BM change	Change in the service, technological, organizational or financial domain of the organization or value network required to realize the desired BM	Which element(s) of the BM in any of the STOF domains should be changed to enable the new BM, i.e. what new service, technology, organization or finance resources are needed to enable effectuating this change in the BM?	Adding more services to a core service Internationalization of service offering New revenue model New technology systems Other partners New competences

			Need for new investment funds
Activities	Practical actions that need to be carried out in order to realize the changes needed in the BM domains	What activity needs to be executed in order to enable the change in the BM domain?	Technology development Partnership formation (i.e., selection, negotiation and setting up the governance structure) Attracting investments

**Table 1: Two layers of a business model roadmap**

### 1.3 Illustrative case

Terribles is an SME that provides a service platform in the dance industry. Dance club visitors can rate clubs and submit their report to Terribles, which provides a website with information about the dance clubs, events, live streaming of shows, etc. Recently, they also launched a social media website where club visitors can interact with each other, and they are launching all kinds of additional services, like mobile payment and ticketing.

Terribles is on the verge of adding more services to their basic service portfolio and expanding their service portfolio to other countries. The desired change in this illustrative case is internationalization, i.e. launching the same core service bundle on foreign markets, and expanding the target group. The next step is to analyze how these changes in the service domain affect other domains. The following implications have been identified (Table 2). Each of these changes can be translated into specific activities (Table 3). It should be noted that these activities are not necessarily unique. For example, capital investment can also be achieved via a bank loan.

BM change	Explanation
Service domain: International branding	The brand of Terribles is currently unknown in foreign countries and needs to gain international recognition.
Technology domain: Multi-lingual website	Currently, the content on the website is only in Dutch, and this should be translated.
Organization domain: Trained software developers	Internationalization requires a greater effort to maintain the website, as more content will be provided. Therefore, more software developers are needed.
Organization domain: Access to foreign	Content about the foreign dance clubs needs to be added to



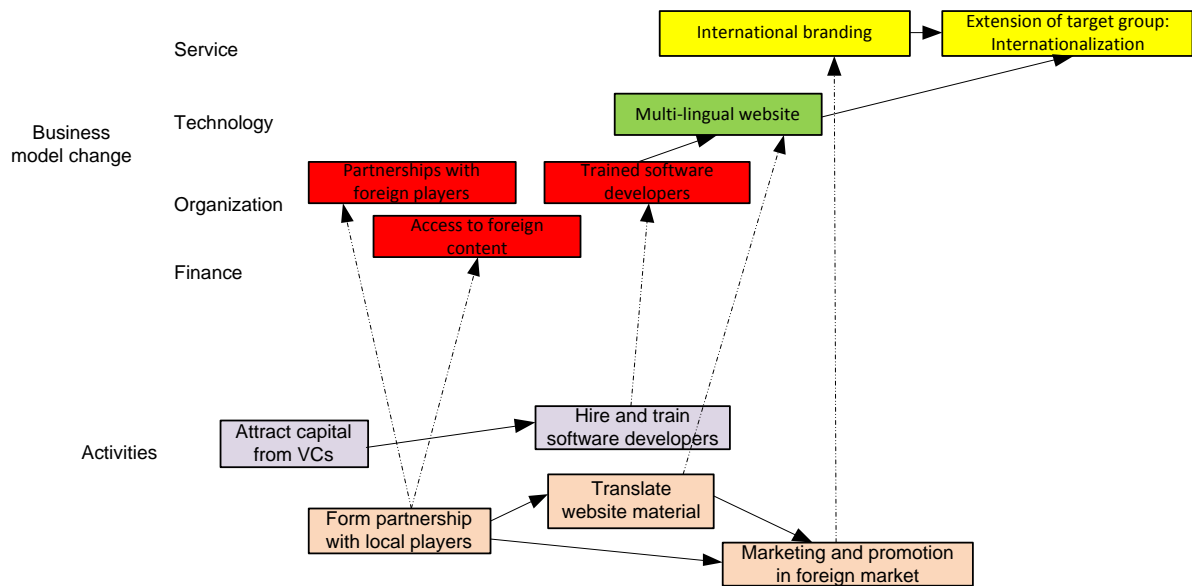
content	the website.
Organization domain: Partnerships with foreign players	To gain access to foreign content, partnerships are needed with local clubs in foreign countries.

**Table 2: Business Model Road-Mapping: Terribles Case – General**

BM change	Activities required to enable the changes
Service domain: International branding	Marketing and promotion in foreign market
Technology domain: Multi-lingual website	Translate website material
Organization domain: Trained software developers	Hire and train software developers Attract capital from VCs
Organization domain: Access to foreign content	Form partnership with local players
Organization domain: Partnerships with foreign players	

**Table 3: Business Model Road Mapping: Terribles Case – Specific**

Next, interdependency between the activities is assessed. The hiring and training of software developers needs to be done before automation of the software platform. Before hiring software developers, capital is needed. Marketing and promotion in foreign markets can only be done after the material has been translated, and marketing efforts have to be coordinated with the foreign local players, which means partnerships have to be formed. It should be noted that the sequencing of the activities may be debatable. By drawing the roadmap (Figure 1), the objective is rather to make the trade-offs on how to sequence the activities subject to discussion.



**Figure 1 Business Model Roadmap (Simplified):  
Terribles Case Internationalization**

In the example, an alternative BM is possible that does not rely on partnerships with foreign players. Content about foreign dance clubs can also be obtained through automated data mining. Although the quality of automatically generated content may be lower, it makes the roadmap less reliant on partnerships with foreign players. This small change has major implications for the order in which activities can be executed, and consequently, the order in which changes are realized. Road mapping can help to make clear trade-offs and to focus on BM changes.

#### 4. Business Models Stress Testing

Choices with regard to BMs are usually complex, because future developments are full of uncertainties, for example in social media, where new entrants have seriously disrupted the market, with Hyves replacing Orkut and MySpace in the Netherlands, and Facebook beating MySpace. These examples raise the question as to how robust BMs are. Are they only viable and feasible in the short run? Are they able to withstand or respond to changes in the environment? To validate the robustness of BMs and BM-roadmaps, scenario analysis can be used. We propose the term *BM stress testing*, defined as validating the strong and weak parts of BMs by applying scenario analysis. As a result, the ‘fit’ of a BM, with a (collection of) future business environment(s), can be determined. This fit can be visualized in a *heat signature* that provides an overview of those elements in the BM that are at odds with a certain scenario or with future uncertainties. Misalignment between an organization and its environment has been recognized as the main cause of corporate mortality.

## 4.1 Typical issues in business model stress-testing

Robustness addresses the longer-term soundness of a BM. Two other aspects are *viability* (does the BM create value for customers and allow you to capture value for your organization) and *feasibility* (is the BM actually capable of delivering as intended?). We discuss threats to BM robustness, what robustness means in practice and how can it be addressed. BM threats are for instance commoditization, in-balance of cost and revenues, lack of alignment with developing trends or narrow focus and single future strategies.

*Commoditization:* Many products and services that initially provide a unique or differentiated value proposition over time become commoditized. In the long run, the BMs may not be sustainable, as competitive pressure forces prices down, leading to falling margins and diminishing profitability. For example, Internet Service Providers (ISPs) are providing triple-play access services rather than separate services. This model is easily copied and replicated, so ISPs may be forced to consider more differentiation in their services.

*Business model continuous viability:* Costs and value are not or no longer balanced if, for example, new entrants start offering cheaper alternatives that disrupt the market. New data applications like Whatsapp, for example, disrupt the revenue potential of SMS

*Lack of alignment with trends:* BMs need to a certain extent be in agreement with evolving trends. For instance proven sustainability, environmental sensitivity and balanced use of scarce resources and space are becoming dominant criteria for the assessment of a firm's governance. Companies that neglect this trend may find themselves excluded from future business, as clients and customers see sustainability as a must-have element in the proposition

*Narrow focus and single future strategies:* Companies often have a view on what they consider to be their most likely future environment, either explicitly or implicitly. This scenario will steer and lead to biased strategic considerations and BM innovations. While the resulting preferred future BM fits well with this scenario, it may be at odds with other alternative future states. Strong convictions on future trends and developments can thus lead to vulnerable BMs. Several infra-based companies turn their focus towards offering service platforms rather than offering services, in order to respond in a flexible way to future market developments. Service platforms may support a multitude of different services and therefore provide a more robust BM than offering services directly. In a stress test, we combine existing BM design approaches with scenario analysis into a hands-on method for developing robust BMs.

## 4.2. Business Model stress testing process

In a more generic sense, testing, involves defining a set of indicators against which the BM elements may be tested. Criteria may be futures scenarios or uncertainties, but could also be success factors or performance indicators. The stress test method follows a six step plan:

1. *Selection and description of Business Model:*

The stress-test method does not depend on a specific business modeling approach being used to describe the BM, as long as the BM to be analyzed has enough richness. In many cases, the details about the BM are described in documents and slides, or exist in the form of tacit knowledge. In practice, a lot of rich information is stored in documentation. The BM is described in a template according to the BM approach (CANVAS or STOF) chosen.

2. *Selection of uncertainties*

This is an essential but difficult task. The selection determines the stress test of the BM and the conclusions be drawn. Several approaches for the selection of uncertainties exist. The most pragmatic options are using publicly available scenarios and select uncertainties from them or determine a set of plausible uncertainties with domain experts. A proper and limited selection of uncertainties makes the stress test manageable. It is important to involve the project team in selecting these parameters and getting the facts right and complete.

3. *Mapping of BM to uncertainties:*

The actual stress test consists of a confrontation between the selected uncertainties and the different components of the BM. A clear picture of how uncertainties relate to BM choices emerges.

4. *Heat Signature:*

This step of the stress-test is all about making choices and estimating or determining the possible impact of the future on the BM. Here, the possible outcomes of the uncertainties come into play. A 'Heat Map' is prepared, using the following coloring scheme to indicate the impact of a specific uncertainty outcome on the BM:

**Red:** Possible showstopper: needs attention from a strategy perspective;

**Yellow:** Negative (or positive) effects cannot be excluded, but attention is required;

**Green:** No negative effects are expected;

**Grey:** No relevant influence.

5. *Analysis:*

An analysis of the Heat Signature provides insight into the weaknesses of the BM. The vulnerability of certain choices is explicitly visible. Potential showstoppers and inconsistencies are identified. The stress test provides not only the color coding but also grounding. Why do certain choices in the BM, eventually, create problems? How can such insight be used to make the BM more robust?

6. *Conclusions:*

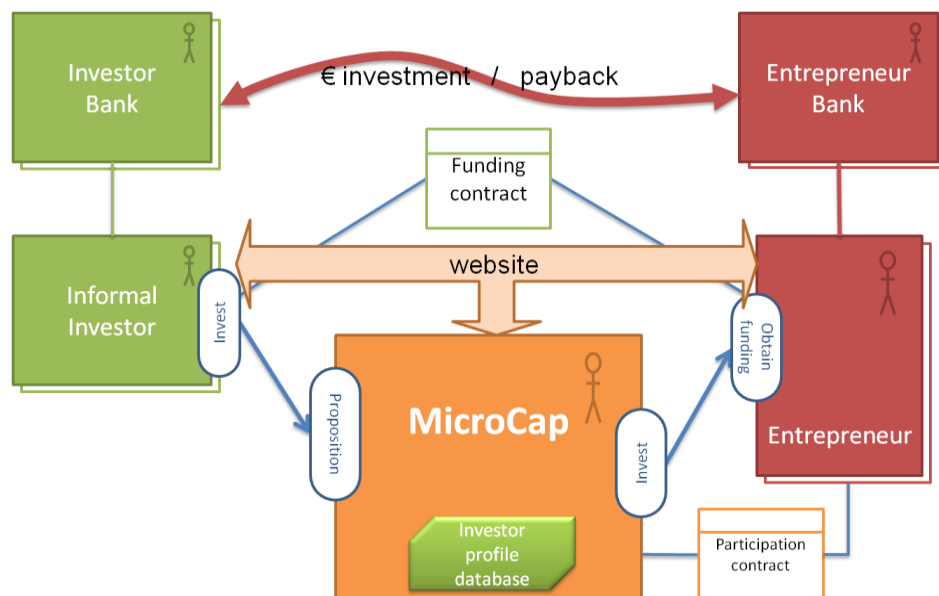
These revolve around insight into the robustness and vulnerable parts of the BM. Typically recommendations are provided that address the weak parts in the BM, or are aimed at improving consistency.

The method provides a structured approach to analyzing each element of the BM. It provides clues to where the BM is not robust and suggests improvements to the BM. For maximum added value, it should be applied at the initial stages of BM design.

### 4.3. Illustrative case

Consider a BM for a crowd-funding platform which we dub 'MicroCap'. Many starting entrepreneurs have difficulties obtaining sufficient financial funds. For banks the business interest is limited due to the low amounts and possible high risks. Yet, the funds required by these entrepreneurs exceed the amount that can be obtained from family and friends.

The MicroCap platform aims to fill this gap, and is seen as a major growth area. The aim of MicroCap is to enable entrepreneurs to obtain funds and allow online investors to participate with micro-investments. The idea is that the sum of these investments generates the funds required by the entrepreneur. MicroCap focuses on social companies and projects and provides a new financial instrument to online investors who want to support and stimulate socio-economical developments. The target group consists of investors who are looking for a return of involvement above a maximization of the return on investment. The elements and their inter-relationships are depicted in Figure 2.



**Figure 2: The MicroCap Networked Enterprise**

The steps for MicroCap are executed as follows:

1. *Selection and description of Business Model.* For MicroCap we used the STOF method. We do not provide the entire BM description. With regard to the service domain, the customers and end-users are considered to be starting entrepreneurs, speculative and active online investors. The value proposition for entrepreneurs is focused, for instance, on obtaining growth capital that is otherwise hard to obtain, access to network of investors, and financial and legal settlements.

2. *Selection of uncertainties:* for this illustrative case, we used scenarios from the World Economic Forum called: “Technology and Innovation in Financial Services: Scenarios to 2020”. The analysis provides a set of eleven uncertainties. Together with the domain-expert, three relevant uncertainties were selected, for instance whether new entrants in financial services will have a high or a low market share.

3. *Mapping of BM to uncertainties:* Obviously, uncertainty about *new entrants* to financial services may have an influence on MicroCap being a new entrant itself. The question is if MicroCap will be accepted as a new entrant by the assumed customer segments.
4. *Heat Signature:* in a future with 'low market capture' for new entrants, it is not obvious that MicroCap can establish itself as a new brand. People for some reason stick to traditional financial service providers, which is a potential showstopper. MicroCap may have to team up with an established financial service provider. In a future with 'high market capture' for new entrants, financial platforms like MicroCap could be more acceptable.

The heat signature, as the end result in Table 4, represents an overall view of the impact of all possible outcomes of the selected uncertainties on the BM. The left column shows the BM domains and variables (STOF method). The upper row shows the three selected uncertainties for this case and their outcomes.

5. *Analysis:* The heat signature shows that many issues still remain to be resolved to arrive at a more robust and viable BM.
6. *Conclusions:* The heat signature shows that, in general, many issues remain open with regard to MicroCap's BM. The problems are not restricted to one specific future state but hold for almost all the alternative futures. MicroCap's BM is vulnerable to competition and struggles with its unique selling point – social versus trusted financial brand. Because social projects are expected to yield a lower profit, attracting investors depends on tax regulations. Changes in regulation affect the size of the investor target group. As a community platform, the success of the platform critically depends on the willingness of investors and entrepreneurs to share (personal) information.

To summarize, the method provides a structured way to analyze the different elements of the BM. It offers clues to where the BM is not robust and where it can be improved. For maximum added value, it should be applied during the initial stages of BM generation. Because the results depend on the selection of uncertainties or scenarios, it is very important to involve the project team in selecting these parameters and getting the facts right and complete.

## **5. Business Models and Agile Software Engineering**

In many service innovation projects, new software has to be developed. BM analyses can support scrum software developers in such a way that the software in question better reflects and supports the business. The tool Dialogues Scrum puts a great deal of emphasis on communication. The 'Dialogue' requires communicative stakeholders and team members, including software developers.

		New entrants into FS		Regulatory flexibility on new players and new BMs		Personal data and privacy issues	
		Low market capture	High market capture	Conservative, inflexible, discourages change	Progressive, flexible, encourages change	"Chinese Walls" for customer data, limited data availability	Extensive commercial use of customer records, people at ease to release personal data
<b>Service design</b>	Customers and/or end-users	Red	Green	Grey	Grey	Yellow	Green
	Target group (primary; secondary)	Yellow	Red	Red	Green	Grey	Grey
	Value proposition	Yellow	Red	Red	Green	Yellow	Green
	Service offering	Yellow	Red	Green	Red	Yellow	Green
	Context of use	Yellow	Red	Green	Red	Red	Green
	Effort for the customer	Green	Green	Grey	Grey	Red	Green
	Customer relationships	Grey	Grey	Grey	Grey	Grey	Grey
<b>Technology design</b>	Applications	Grey	Grey	Grey	Grey	Grey	Grey
	Devices	Grey	Grey	Grey	Grey	Grey	Grey
	Service platforms	Green	Red	Grey	Grey	Green	Green
	Channels	Yellow	Red	Grey	Grey	Red	Green
	Additional functionalities	Grey	Grey	Grey	Grey	Grey	Grey
<b>Organization design</b>	Actors	Yellow	Red	Red	Red	Grey	Grey
	Actors' resources & capabilities	Yellow	Red	Green	Red	Red	Green
	Actors' strategic interests	Yellow	Red	Grey	Grey	Green	Green
	Organizational Arrangements	Green	Red	Grey	Grey	Red	Yellow



	Value activities	Yellow	Red	Grey	Grey	Green	Green
Financial design	Investments	Yellow	Yellow	Yellow	Green	Red	Green
	Costs	Green	Yellow	Yellow	Yellow	Grey	Grey
	Revenues	Yellow	Red	Red	Green	Grey	Grey
	Risks	Green	Red	Red	Green	Red	Green
	Financial arrangements	Grey	Grey	Grey	Grey	Grey	Grey

**Table 4: Stress Test Heat Plate for the Microcap Case**

### 5.1 Typical issues in Dialogues Scrum

Translating business objectives into technical solutions and vice versa is a problem. In the best case, there are people on both sides who can talk to each other, but there is no methodology or framework to transform the discussion into a meaningful dialogue.

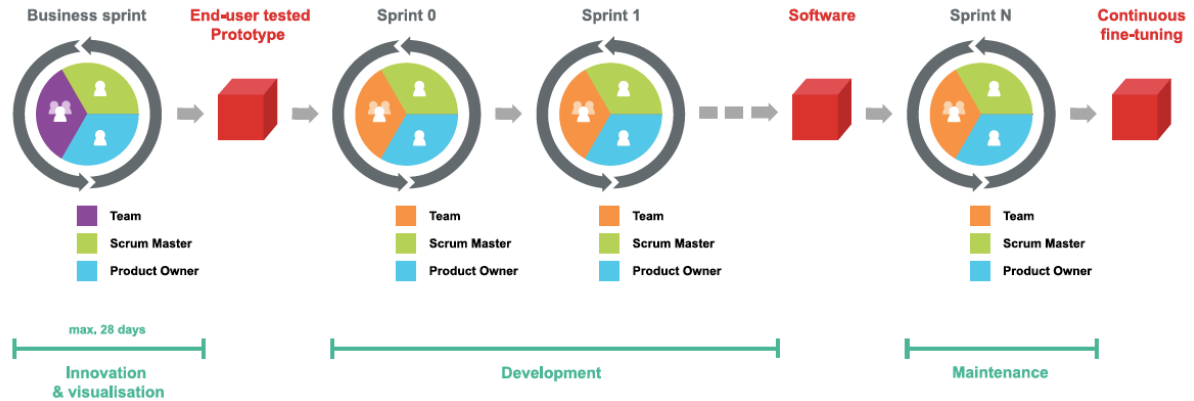
‘Dialogues Scrum’ offers a shared ‘cognitive space’ where new concepts and products can be developed effectively and efficiently, making it possible to leverage the available intellectual capital to the benefit of both business and IT. Moreover, Dialogues Scrum is able to deal with changes that can occur in every dynamic business environment. Implications of these changes can be translated directly into software development. Software engineering projects that use ‘Dialogues Scrum’ also have a different starting point compared to other agile software development methods.

### 5.2 Dialogues scrum process

The Dialogues Scrum follows certain steps. (See Figure 3). Sprint 0 to sprint N covers the general Agile Scrum methodology. The time spent during the business sprint is used to better understand the business value and complexity of the project, by involving innovators and user experience designers who help define the project’s BM. For example, the STOF model or the Business Canvas can be used in conjunction with the Dialogues Scrum framework. The service concept is defined in detail, followed by a visual prototype, which reduces ambiguity in comparison to a written document and provides a better understanding of the business value to the team. The visualization of the prototype also allows for end-user testing.

The visualization of the prototype (final visual designs of the project, wireframes, etc.) during the business sprint provides the input for the development team in Sprint 1. In Sprint 1, the product backlog is formulated with a clear understanding of the business value. Usually, formulating the product backlog is not an activity on which Agile Scrum tends to focus. Instead,

Agile assumes that it already exists. However, in practice, creating such a product backlog can be a difficult process that can be facilitated with a business sprint.



**Figure 3: Business Models and Agile Scrum: Business Sprint as Starting Point**

Since the methodology is iterative in nature, the results of the business sprint are discussed with the stakeholders and further improved until they meet customer and stakeholder requirements. This improves the product by highlighting its unique selling point(s). In addition, the business sprint can be used to inform clients on how Dialogues Scrum works. After the prototype is discussed and tested with the end-users, the project enters Sprint 0, in which the business process is tested. From Sprint 1 to Sprint N, the development iterations concentrate on delivering working software that meets the defined criteria. After development, the following iterations can be seen as maintenance sprints.

### 5.3 Illustrative case

A web portal that helps people manage their pension funds real-time, using the latest financial instruments, was developed. The business sprint made short communication-lines possible as well as providing the development team with the necessary feedback. Dialogues Scrum demanded a high level of commitment from the client. The illustrative case provided some insight into the effect of the business sprint. Misunderstandings from a business perspective became clear when the first wireframe was presented. This early analysis allowed the client to contemplate what was really required, and made it clear that some elements that initially were considered highly relevant could in fact be omitted. The visual prototype helped the clients to explore concrete business ideas in more detail but also offered the client insight into how Dialogues Scrum works. Having a more elaborate requirements elicitation process provided insight into what was needed from the project and how the BM could be translated into software.

Agile Scrum is rapidly emerging as a mainstream approach to dealing with software design in a dynamic environment. Combining Agile Scrum with BM design allows for rapid feedback on business viability of developed software artifacts.

## **6. Business Models and Financial Tooling**

When it comes to making informed management decisions with regard to financial aspects of alternative BMs, there are hardly any tools available, specifically when multiple stakeholders and financial objectives are involved. The proposed BM Decision Support System we discuss in this section builds on the STOF model.

### **6.1 Core concepts**

The tool (BM-DSS) is innovative in five ways. Firstly, it offers support in all phases of the financial decision-making process. Stringent information requirements apply to the use of the capabilities offered by the BM-DSS (e.g. the need to gather reservation prices). Secondly, the DSS incorporates market analysis capabilities, which means that BM design activities can be based on real data. However, it also means that a market analysis, a combination of conjoint analysis and assessment of potential target groups, has to be carried out prior to designing a BM. Thirdly, the DSS divides BM design into particular design issues, as defined for the four STOF domains (Haaker et al, 2006). The critical design issues are easily adaptable to an organizational context. However, this requires close coordination between multiple users and decision-makers. Fourthly, the DSS incorporates decision analysis capabilities, which makes it possible to compare BMs. However, this assumes that the decision-making problem can be hierarchically structured and that the importance of each objective of each structural partner can be determined. Finally, the DSS uses a flexible spreadsheet-based technology, which means it can be adapted quickly to specific situations.

### **6.2. Method**

Developing a DSS for BM design is a dynamic process. The design steps, as defined in the STOF methodology (Faber & De Vos, 2008), should be carried out iteratively. A variety of organizational departments of the core services provider, like *marketing intelligence*, *marketing and product management/development*, and their structural partners are involved in designing BMs. Managers who ultimately decide whether or not to implement a BM, whether changes should be made or whether the project should be aborted, are in the lead. Depending on the type of relationships between structural partners, representatives of the board of the partners can also be involved. The BM-DSS is divided into different components and worksheets that contain core performance objectives. Separating intelligence, design and choice allow the DSS to be used at different levels in the organization. The decision-making analysis can be used by the board, while other departments can be involved in intelligence and design. For each critical design issue, a range of decision-making criteria are provided, allowing designers to work independently on specific design issues. However, some common evaluation criteria are also provided, which in turn allows designers to collaborate. The division helps users deal with design issues in different sequences, which means that a variety of decision-making processes is supported.

### 6.3 Illustrative case

The DSS discussed in this case was developed for a multinational software company that offers Software-as-a-Service (SaaS) solutions to its customers. More and more businesses have adopted SaaS as a distribution and pricing model. To achieve modularity with regard to the BM-DSS, functionalities were divided into three parts: (1) the *market analysis*, (2) the *BM design* and (3) the *decision analysis*.

*Design and selection.* For the case study, several BM designs were created using the BM-decision tool. The results are presented in spread sheets. (See figure 4). This example shows that the DSS is effective in optimizing BM design for different financial objectives (e.g. profit, revenue and market penetration), when dealing with different objectives with different levels of importance. The *objective importance scores* for the service provider may, for instance, be determined by the board. Each objective's importance, as far as the service partners are concerned, may be determined on the basis of negotiations between the service provider and its service partner(s). The importance of service partners for the value network can also be specified. Dealing with risk and uncertainty becomes easy, for instance, in this illustrative case, an additional risk criterion was included to take differences in uncertainty and risks resulting from different financial arrangements into account. The scores regarding the risk criterion were determined on the basis of a qualitative assessment of the financial arrangements. For the lowest level criteria, the design evaluation scores are calculated, after which the different designs are ranked, helping decision-makers in choosing the best available BM form a financial point of view.

	A	B	C	D	E	J	K	L	M	N	O	P	Q	T	U	V	W		
1	Last modified: xx-xx-xxxx																		
2	Business model selection																		
3	Importance of actors						Business model viability comparison												
4		Service provider	Partner A																
5		1,00	3,00				0,75	75,0%						Design 1	Design 2	Design 3			
6		0,33	1,00				0,25	25,0%						32,0%	33,2%	34,8%			
13								100,0%											
14																			
15	Service provider's Viability indicators						Service provider's Viability indicators						Design evaluation scores						
16		Revenue	Market.	Profit.	Risk	Local	Global							Design 1	Design 2	Design 3	Design 1	Design 2	Design 3
17		1,00	0,33	1,00	3,00	0,19	14,06%							3310032	3555232	3870421	0,043	0,047	0,051
18		3,00	1,00	3,00	9,00	0,56	42,19%							36790	36015	36016	0,143	0,140	0,140
19		1,00	0,33	1,00	3,00	0,19	14,06%							9,8	19,7	14,7	0,031	0,063	0,047
20		0,33	0,11	0,33	1,00	0,06	4,69%							9	1	5	0,028	0,003	0,016
25																			
26	Partner A's Viability indicators						Partner A's Viability indicators						Partner A's Viability indicators						
27		Revenue	Market.	Profit.	Risk	Local	Global							Design 1	Design 2	Design 3	Design 1	Design 2	Design 3
28		1,00	1,00	0,14	0,20	0,07	1,79%							331003	300000	253463	0,007	0,006	0,005
29		1,00	1,00	0,14	0,20	0,07	1,79%							10843	12005	10844	0,006	0,006	0,006
30		7,00	7,00	1,00	1,40	0,50	12,50%							40	27,2	22,2	0,056	0,038	0,031
31		5,00	5,00	0,71	1,00	0,36	8,93%							1	5	9	0,006	0,030	0,054

Figure 4: Example of BM-DSS Result

The BM-DSS tool transcends mere brainstorming and discussions about BMs by allowing every stakeholder to have a say about which BM is preferable. At the same time, the tool goes

beyond multi-criteria decision tools by incorporating marketing data and conjoint analysis, and making use of, for instance analytic hierarchy process (**AHP**). The use of market data and conjoint results makes it possible to incorporate parameters based on empirical research.

## **7. Combining BMs with Process and Architecture Approaches**

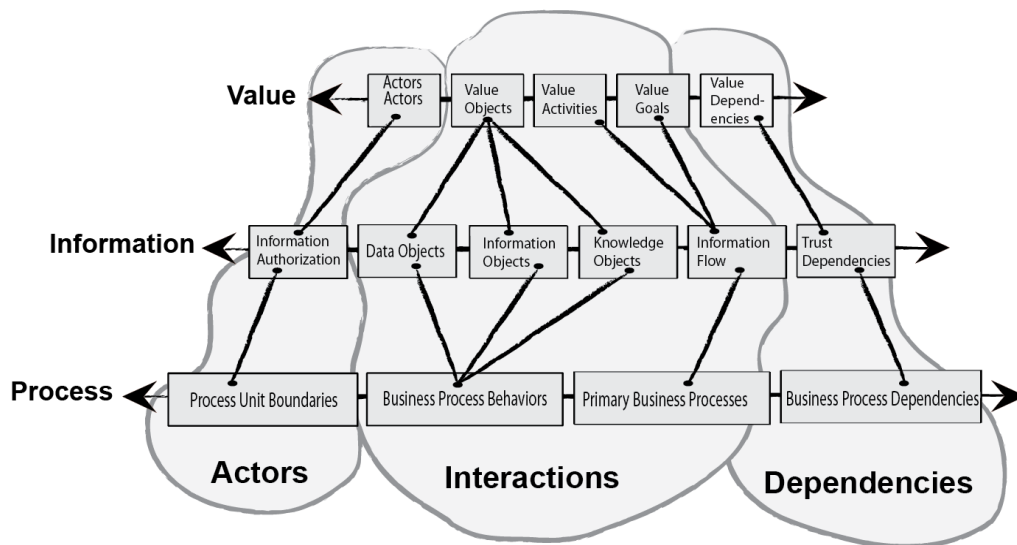
In the preceding section, we presented four tools that were developed based on our BM approach. However, one of the major issues with regard to tooling has not yet been addressed, which is how to connect BM approaches like STOF and CANVAS to Business Process models (BPMs) or Business/Enterprise Architecture ontologies that describe individual businesses or enterprises, taking into account the fact that services are delivered by multiple collaborating companies and enterprises. The tooling proposed here is not designed to replace existing approaches and tools but to bridge the gap between the holistic BMs and the practical tooling surrounding value production, business process, information exchange and IT support. (See also Al-Debei and Avison, 2010). Integrating the tooling regarding BMs and processes allows for a more practical planning of how a desired BM should be implemented. The feasibility of a designed BM can be further tested by modeling the implications at process level focusing on Value and Information exchange as well as on Process alignment (VIP).

### **7.1 Core concepts**

While a BM describes *what* the business ought to be doing to deliver and capture value, *how* this is (or can be) done requires an in-depth understanding of underlying business processes. Business partners have to deal with value exchange within the core organizational network providing a service, to close information loops and align dissimilar underlying business processes and procedures. Value, information exchange and operational processes are more likely to be incoherent or even conflicting. They are seldom aligned and more often than not form a closed loop.

Innovative BMs are constituted by the interaction and exchange of value, information and knowledge between different actors. These interactions are conceptualized using divergent tools and described by widely divergent BPs. For instance, there are some examples of how value and information exchange processes are described (for instance e3 value model promoted by Gordijn and Akkermans, 2001; *Activity Dependency Model* promoted by Bergholtz et al., 2004), and of architectural ontologies such as ArchiMate (Lankhorst, 2009) or ARIS (Scheer, 2000). While the latter are focused on individual firms, the former are less engaged in describing operational processes. For individual organizations, operational business processes and procedures, together with information management, are defined, described and managed using many different tools and techniques, for instance BPEL or aforementioned architecture approaches.

However a theory bridging the conceptual gap between the strategic ‘what’, represented by BMs, and the operational ‘how’, described by Business Processes for collaborating organizations, is largely missing. To bridge the gap, the three domains, Value and Information Exchange, and Process Descriptions are introduced and depicted in a layered framework. (See Figure 5). The figure illustrates the dynamics between and within the layered domains (i.e., vertical and horizontal lines). The analysis of each component and its dynamic vertical and horizontal relationship with adjacent components brings strategy and operations together.



**Figure 5: The VIP framework**

The approach described here does not aim to replace existing ontologies for architectures, process analyses and descriptions, but rather to combine BMs and operational processes, specifically for networked enterprises. This intermediate step helps process designers to model fine-grained business processes in a BM-driven way, regardless of the modeling approach. In this way, an analysis of the operational arrangement of the actors involved can be conducted at an early stage, prior to the definition, design and redesign of a complete and detailed B(P)M. Currently, we are conducting case studies to assess the effectiveness of the approach, and will be followed by the design of a practical tool. An illustrative case provides some insight into what we are trying to achieve.

## 7.2 Illustrative case

The widespread diffusion of Broadband into people's homes and the increasing aging problem has inspired four large companies to collaborate in creating an innovative remote health care service at home. Venus is one of the leading ISPs in Europe, Jupiter is a large national healthcare provider, specialized in preventive health care, Neptune is a trusted Internet security provider and Saturn is one of the largest national insurance companies with several

international branches. The consortium has developed a BM that describes the logic of the intended service. However, implementation remains an issue, i.e. (1) how will the value exchange between the actors involved, take place? The value exchange has to be a closed loop, but will there be a balance between involved actors? If Jupiter is facing all the costs and Saturn reaps all the benefits, there is a real issue; (2) information exchange has to be aligned as well; and (3) it has to be determined how to run the BM without failing at an operational level. Operational failures are, for instance, conflicting procedures at some points, a lack of access to resources, contradicting value propositions on the part of some actors, and a lack of insight into knowledge supply and demand between actors involved.

So far, several attempts have been made to define the underlying BPs aligned with the BM; all actors have their own description of the operational BPs: Venus has several high-level BPMs (using process modeling tool 'X') for different business units, Jupiter has a formal protocol on which the health services are based, Neptune has high-level descriptions of the activities and procedures instead of detailed BPs, and Saturn has a large fine-grained BPM, defined by process modeling tool 'Y'. As for the consortium, it is an unsolved yet challenging issue to align the various BPs with each other and with the BM. The use of the BM-VIP framework helps the actors involved visualize how to handle value and information exchanges in a networked enterprise, and how to describe the interface between operational processes, by using existing ontologies.

## **8. Conclusion**

Since the early introduction of the Business Model concept at the Bled conference, the concept has become well established and is not only used in business practice, but also being adopted by researchers in different disciplines. Information systems research has been an important driver for this type of research. While in the past the Bled conference inspired several BM approaches to focus on conceptualization and on design of BMs, the current focus is on developing tooling for BM design, and on the further integration of BM research and IS research. Recently, strategic management researchers have discovered BMs as a new research domain. The focus of their approach is rather limited, e.g. on value propositions, customer segmentation, strategic assets and revenues streams, leaving a lot of questions open with regard to resources, partnership management and the role of IS. Areas that are currently under-researched include BM's dynamics, and a prescriptive way of dealing with uncertainty and future robustness of BMs.

In our approach, we try to include relevant questions with regard to both issues, focusing on uncertainties and future development of BMs and the role that IS support can play. In this paper, we have provided illustrations of tools that were developed on the basis of our BM approach. We gave examples of BM road-mapping and stress testing. Research is needed, to show that these tools contribute to the performance of business models. This also points to one of the weaknesses of BM research, viz. the lack of clearly defined and widely adopted key

metrics related to BMs. At a more practical level, we addressed the way BM research can be combined with Agile Scrum approaches, and BM decision support systems, focused on, but not limited to, financials.

In future research, we think we have to move beyond generic BM design and development and develop new more simplified and practical approaches and ideas for implementation. Research has to focus on integrating the holistic BM models, STOF, Canvas or Unified BMs, with architectural and process modeling approaches. It is essential that BM thinking be demonstrated to contribute to practical solutions and is not merely a strategist and marketing pastime.



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