

Modelling in Business Model design

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EGOS Montreal main theme related: Bridging the fields of expertise of strategic management and design methodology and bridging between scholars and practitioners.

Sub-theme 22: Business Models and Organizations: Uncovering the Origins of New Business Models. Related by the research program on Designing Business Models for Home Healthcare.

This paper addresses the Business Model topics of:

- What *Recipe of Modelling* business models can assist strategic managers and - designers in thinking about how they can act? What are modelling possibilities and limitations of manipulating Business Models?
- How does modelling of Business Model innovation in *eHealth* improve our understanding of modelling?
- What of the Business Model *Metaphor* can be modelled and *visualized* by designers?

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Abstract

It appears that business model design might not always produce a design or model as the expected result. However when designers are involved, a visual model or artefact *is* produced. To assist strategic managers in thinking about how they can act, the designers challenge is to combine strategy and design notions. However, so far little is known about the modelling methods and *recipe* approaches that can be used.

In this paper the author discusses the development of a methodology for modelling business models. The first half of the paper discusses the theoretical background and the second half the design methodology. In the theoretical background part, (1) the origins of business model design are uncovered in three streams of theory, (2) the essential characteristics of business models are identified and (3) the modelling notions and principles from the design theory perspective are provided. In the design methodology part, (4) three artefacts examples together with the modelling approaches are reported from three case experiments in the eHealth context, (5) the design methodology for business model design is synthesized and (6) research limitations and further directions are suggested.

Practical implications include a framing of the ‘art of modelling’ a business model into a methodology that supports designers and strategists in thinking about how they can provide customers with value propositions in the context of network partners and financial conditions.

Theoretical implications are threefold: (i) it advances the business models concept conceived in the field of strategic innovation management with the modelling aspects from design methodology; (ii) it provides artefacts examples that support strategists and designers in thinking about how they can act and (iii) it develops a modelling approach (*recipe*) that supports symbolic prototyping of a business model.

Introduction

In 2010 McGrath wrote:

“Modelling a business is considered to be a useful approach to figuring out a strategy by experimentation and prototyping. By engaging in significant experimentation and learning in a ‘discovery driven,’ rather than analytical approach, Business model design aims to discover and exploit new model (McGrath, 2010)”.

Few strategy approaches have appealed more to the ability of a designer than this *business model design*, with its aspect of ‘*modelling, experimentation, prototyping and discovery*’. Yet, artefact examples of designs or models as end results of business model designs are hard to find. And modelling approaches that support prototyping a business model design are lacking.

Although more strategy management scholars, such as Casadesus-Masanell & Ricart (2009) have pointed out that “*the exercise of designing new business models is closer to an art than to a science*”, only recently designers got involved in business model design. In keeping pace with the changing social roles of industries, the roles of industrial designers are transforming from merely product design to father reaching social service solutions design. Designing service solutions within new social contexts of human experience often includes the designing of a new business model (Morelli, 2007). Designers are found in new positions to apply ‘design thinking’ to business models that impact social relations. For instance Frog (UNICEF, 2012), IDEO (2012) and LAXMI (Sharma, 2012) provided artefact examples of business model designs. From these business model artefacts we are able to build some initial knowledge on the contexts and problem situation of a business model design but it is hard to reconstruct the frames and approaches used in the modelling of a business model.

Furthermore for practising business model design, the understanding of business model characteristics is essential. As the business model construct was conceived in the discipline of strategy management an identification of the essential elements of a business model design is necessary. Together with the identification of guidelines from design methodologies conceived in the discipline of design, the boundary conditions are set for carrying out design research experimentation, prototyping and discovery in coherence with the research direction that McGrath (2010) suggested.

Against this background a research program was launched in 2011 *to develop a design methodology for use in business model design*. Basically we are at the start of building designerly knowledge on business models. There is a gap to fill on a modelling methodology for business models and the theoretical underpinning of this. To contribute here, our aim is to bridge two fields of expertise, the strategic management field and the design methodology field. The contribution of this paper are threefold: (i) it advances the business models concept conceived in the field of strategic innovation management with the modelling aspects from design methodology; (ii) it provides artefacts examples that support strategists and designers in thinking about how they can act and (iii) it develops a modelling approach that supports symbolic prototyping of a business model.

In the next section, this paper addresses the theoretical background in which: (1) we uncover on the origins of business model design in three streams of theory, (2) we identify the essential characteristics of business models and (3) we provide the modelling notions and principles from the design theory perspective.

Then the following section reports the results and conclusion from our design research in the social context of eHealth: (4) we present three artefact examples together with the developed modelling methods; (5) we reflect with the synthesis of the design methodology for business model design and (6) we conclude with a discussion of the research limitations and further directions for future research.

Theoretical Background

eBusiness model origins in Strategic Management

In the literature of strategic management, we traced back the origins of the business model construct that relates to the start of e-business start-ups. Basically for the understanding and explanation of this new phenomenon of eBusiness, three theoretic perspectives have been developed within strategic management (see Table 1): 1. Information systems perspective; 2. Corporate perspective and 3. Innovation perspective.

(1) On the first information system perspective Osterwalder (2004) has built a business model ontology. He first applied the Information System Design science method and later

composed the community book (Ostenwalder & Pigneur, 2010) introducing the business model canvas with building block elements. This canvas has gained considerable popularity at our design school. To some extent this canvas appeared to be useful for the analysis and overview of business model elements. It frames the standardized elements of a business model. However, like a SWOT-canvas does not model a strategy, also this canvas does not model the business model. The standardized elements are not connected by transactions, nor visualized by a model structure that uniquely identifies the business model.

(2) The second corporate perspective, most heavily focuses on building a theory. Initially Amit & Zott (2001) found new characteristics from the eBusiness disruptions that could not sufficiently be explained by existing strategic management theories. Based on these insights they came up with a definition for a business model that is now widely adopted:

“A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities, (Amit & Zott, 2001)”.

This construct was initially distinguished from the conventional theories of value chain, resource based view, network theory, transaction theory and Innovation theory. But nowadays, theory contributions concentrate on integrating and connecting business models with classical managerial concepts as product market strategy, competitive advantage, firm performance and activity theory. These theory contributions may advance the business model construct with additional frameworks, but it also leads to an extending and more broaden interpretation and integration of the business model concept into the strategic approach of incumbent firms. Eventually shifting into the direction of organization design (Galbraith, 1977) and organization change and transformation. This in contrast to third theory perspective that relates strongly to the start-up contexts of the eBusiness models innovation.

(3) For design research contributions we most closely connect to this third perspective on business model innovation at the intersection of innovation - and strategic management, as most of the designers work is in a context of realizing innovation. We found that the design of novel business models is acknowledged with a separate subject category of patents, distinguished from the categories of subject matter: machines, articles of manufacture and compositions of matter, business model innovation has become recognized

Table 1. Theoretical perspectives on Business models

Theory perspective	Key references	Focus of Research contributions
<p>1. Information systems perspective</p> <p>at the intersection of information systems and strategic management</p>	<p>Timmers (1998) Mahadevan (2000) Hedman & Kalling (2003) Pateli & Giagliis (2004) Ostenwalder (2004) O'Reilly (2007) Ostenwalder & Pigneur(2010)</p>	<p>on describing the innovative features and characteristics of models enabled by internet technology to define taxonomies of e-business models . Such as for example model classifications of e-shop, e-procurement, e-auction, e-mall, third-party marketplace, virtual community, value chain service provider, value-chain integrator and collaboration platform and information brokerage. And the business model canvas with building block elements grounded in the Information System Design science method.</p>
<p>2. Corporate perspective</p> <p>at the intersection of corporate strategy and strategic management</p>	<p>Afuah & Tucci (2001) Amit & Zott (2001) Zott & Amit (2007) Zott & Amit (2008) Baden-Fuller & Morgan (2010) Zott & Amit(2010) Teece (2010) Demil & Lecocq (2010) Tracey, Phillips & Jarvis (2010) Zott, Amit & Massa (2011)</p>	<p>on building a theory from the eBusiness disruption. Initially new characteristics were found that were distinguished from the conventional theories of value chain, resource based view, network theory, transaction theory and Innovation theory . Such as, that through the use of internet technology more connections with complementary partners are enabled, fostering new forms of collaboration. Or that, new propositions of bundles with services, software and hardware products, lead to lock-in value propositions as for example Apple's iTunes platform. Also findings included that the internet technology in the new business models leads to an increased efficiency of coordination that impact the transaction costs between partners. But nowadays, theory contributions concentrate on integrating and connecting business models with classical managerial concepts as product market strategy, competitive advantage, firm performance and activity theory A growing number of theory contributions are now focusing on integrating the business model concept into the corporate strategy theory.</p>
<p>3. Innovation perspective</p> <p>at the intersection of innovation and strategic management</p>	<p>Kim & Mauborgne (2000) Amit & Zott (2001) Markides (2006) Johnson, Christensen & Kagermann (2008) Doganova & Eyquem-Renault (2009) Sabatier, Mangematin & Rousselle (2010) Chesbrough (2010) Hienerth, Keinz & Lettl (2011)</p>	<p>on understanding the network models of eBusiness. Novel business models appeared to integrate the network technology and strategic network organizations into new business models . With for example crowd sourcing as a novel type of value creation, beyond the product and process notion of innovation from Schumpeter.</p> <p>Kim and Mauborgne introduced the 'business model guide' as a tool to build profitable business models by analyzing a price model in relation to cost targets in the value chain versus partner capabilities establishing network relations. Type of models they introduced are for example: direct selling – leasing – time share – slice-share or equity payment. These type of business model design leads to new markets with new customers innovation.</p> <p>Business model innovation holds new inventions of creating value without the innovation of products of processes. Evidenced by the patents that start-ups have received for their internet based business methods as unique intellectual property of a business model innovation. Such as well-known examples of patented business models.</p>

as a new locus of innovation. Since novel business models span firms and industry boundaries, the business model innovation involves new exchange relations and unique transaction methods and foster new forms of collaboration among several firms or organizations, combining the resourcing of capabilities in a strategic network with a new design of a business model (Simonse et.al., 2012). Yet, artefact examples of models as end results of business model innovation are hard to find. And modelling approaches that support prototyping a business model design are lacking. The art of modelling a business model still needs to be framed. We conclude that there is a gap to fill on *modelling business models*. Building upon the existing knowledge so far, and most closely on the theories of the third innovation perspective, the present paper contributes in advancing the business models knowledge with the development of a modelling approach.

Essential characteristics of Business model design

In design, before generating and creating a design or model, the analysis of essential characteristics is necessary. From the business model innovation stream of literature we identified the essential characteristics of business models (see table 2).

In the first place, the business model should be an integrative network model, integrating network organisation with network technology. The source of innovation is the information and communication technology that enables new models of business organisation. We view the object of a business model from the design perspective within the boundary conditions of innovation for a new product-service/market/technology combination in relation to a network partners, including customers and non-profit organizations (Simonse et.al., 2011).

In the second place, ‘depicts’ is an essential element of a business model design, referring to a visual object of a model; Third, ‘structure’ referring to the form and model of a business model; And fourth ‘transactions designed’ is essential. Transactions relates both to the network theory as the economic theory of transactions. Furthermore, from the accompanied analytical framework of Johnson et al. (2009), four essential characteristics of a business model are identified. Without the *customer value proposition*, a business model makes no sense. In exchange the primary transaction concerns the price that a customer pays for the value proposition. The characteristic of *profit formula* concerns all the financial aspects

related to the business model design. Followed by the secondary transactions between *resources* such as partners or units of employees and *process activities* in a network.

Table 2. Essential characteristics of Business model Design

Essential business model characteristic	Key references	Element from business model Innovation theory
Integrative Network model	Markides (2006) Chesbrough (2010) Hienerth, Keinz & Lettl (2011)	Innovation in eBusiness created novel network models: integrate the <i>network technology</i> and <i>strategic network organisations</i> into new business models
Depicts ~ visual object		<i>Construct definition</i> "A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities"
Structure ~ form of model	Amit & Zott (2001)	
Transactions designed ~ network exchanges		
Customer value proposition		<i>Analysis framework:</i> Four pillars determine the content of a business model: (1) the Customer Value Proposition is based on latent consumers need(s). A business model design needs focus on a proposition to deliver value to consumers to meet the latent need. (2) The profit formula behind the value proposition is needed to make the business model viable and profitable. Perceiving and deeply understanding the customer needs and their willingness to pay, and balancing it by adapting according to Teece (2009) the "business architecture, the pricing model and the competitive positioning". The pillars for the business architecture that structure the proposition are: (3) the resources including employees and partners (4) processes in terms of value chains and value network activities as process design of transactions.
Profit formula	Johnson, Christensen & Kagermann (2008)	
Resources		
Processes		
Distinctive labeling	Sabatier, Mangematin & Rousselle (2010) Kim & Mauborgne (2000) Timmers (1998)	Patented business models are Amazon's one-click method and Priceline's buyer drive online reverse auctions. Iconic business model labels with the name of instigator company (e.g. Amazon, 3M, Dell, Google). Compare and contrast with taxonomies: Price models: direct selling – leasing – time share – slice-share or equity payment. Taxonomies of e-business models: e-shop, e-procurement, e-auction, e-mail, third-party marketplace, virtual community, value chain service provider, value-chain integrator and collaboration platform and information brokerage.

Finally, business model design should also have a distinctive label so as to confirm the innovation of the business model with respect to existing business models in the marketplace. A patent is the most distinctive label, but own firm inscriptions and new labels can also be applied to combined categories of models that can lead to the creation of a unique business model design.

By using and advancing these essential business model characteristics the modelling of a business model design can be reframed in: *Modelling value transaction and a network structure of process transactions.*

Modelling in design perspective

In the design discipline, Cross (1982; 2001) identified modelling as the intellectual skill of designers in contrast with experimentation in science and evaluation in art. In the Design tradition, models are the sketches and drawings of proposed design solutions, including computer aided models. We built on this type of modelling. Not to confuse with the ‘formal modelling’ approaches of operational research that according to Schön (1983) demonstrated the limits of technical rationality, (p.44)”. Instead we use an intelligent action approach in our design research. As reflective practitioners designers reflect on their actions during and after experimentation in the context of the design cases (Schön, 1983).

For modelling from a theoretical point of view we built on Simon’s notions of modelling a complex system.

“modelling is a principal tool for studying the behaviour of large complex systems... with some basic principles to manage this complexity. We must separate what is essential from what is dispensable in order to capture in our models a simplified picture of reality which, nevertheless, will allow us to make the inferences that are important to our goals (Simon, 1973)”.

Simon (1973) provides some principles for modelling. Inspired by the emerge of chaos theory and the notion of nonlinearity he argues to replace models used for prediction by models of prescription. As essential principles we extracted the notion of (1) Capturing the essential; (2) Prescribing consequences and (3) (re)Presenting Symbols Prescriptive models. In practicing modelling, the language of designers is a visual and object language. Designers use symbols, signs, and metaphors through the medium of sketching, diagrams and drawings

Table 3. Essential notions of Modelling methodology in Design

Essential modelling notions	Key references	Element from Design theory and methodology
Intelligent acting in context	Cross (2001)	Models are the sketches and drawings of proposed design solutions, including computer aided models.
Reflecting during and after experimentation	Schön (1983)	We use an intelligent action approach in our design research and reflect on our actions during and after experimentation in the context of our design cases.
Capturing the essential	Simon (1973)	<i>Principles</i> “modelling is a principal tool for studying the behaviour of large complex systems... Some basic principles to manage this complexity. (1) We must separate what is essential from what is dispensable in order to capture in our models a simplified picture of reality which, nevertheless, will allow us to make the inferences that are important to our goals.
Prescribing consequences		(2) Prescriptive models are constructed to understand the consequences of taking one decision or another. Prescriptive modelling provides insights on orders of magnitude, aggregates as much as possible and uses symbolic modelling where appropriate.
(re)Presenting Symbols		(3) Symbolic modelling refers to symbols that represent natural language, pictures or diagrams rather than numerically.
Visual thinking	Goldschmidt (1994)	“...in situations of preliminary 'front edge' of addressing a new design task architects and designers think visually, and that such visual thinking, even when it is 'intuitive' and involves tacit knowledge, is perfectly rational and highly systematic. Some of the sketching does not follow ideas in the mind but instead, precedes them”.
through medium of sketching, diagrams and drawings		the language of designers is a visual and object language. We use symbols, signs, and metaphors through the medium of sketching, diagrams and drawings to translate abstract requirements into concrete objects. The way we communicate as designers, is through visual thinking, framing and coding design requirements into new models.
Producing an Artefact	Cross (1982) Hilpinen (1992) Galle (1999)	Models are the sketches and drawings of proposed design solutions, including computer aided models. Produced end result: "physical objects which have been manufactured for a certain purpose or intentionally modified for a certain purpose".

to translate abstract requirements into concrete objects. The way we communicate as designers, is through visual thinking, framing and coding design requirements into new models. By applying the ability of generative modelling and visual thinking designers are

open for new discoveries of business model inventions if they can combine this with clear synthesis and reasoning. Finally, we consider the notion of producing an artefact (Galle, 1999) as essential in the development of this backbone of design methodology.

Design Methodology in Action

Multiple field experiments

In view of the above identification of the essential characteristics of business models and the modelling notions from design methodology, a research program was launched in 2011 in the field context of eHealth. In line with the modelling notions, we choose for a case study approach with field experiments of design by research, to open up the black box of modelling business models, and moreover, to experience in action what actually needs to be modelled. Part of the research program are subprojects with BSc designers for a period of 20-24 weeks. Two designers dedicated their graduation project to the modelling of business models. Two other designers participated in this research program through the course Strategic Product Design Research. In this course the central learning objective is the application of Design Methodology. During two semesters a field experiment of business modelling is prepared in the context of eHealth technologies and networks. In the field experiments the BSc designers make use of their design ability of modelling and visual thinking for finding a balance between the technologically possible (an engineering approach), the socially desirable (a user-oriented approach) and the strategic achievable (a strategic approach).

Sample

With three cases we experimented in the field of eHealth. As the gained interest and growing importance of business models relates to industry disruptions of internet technology enabling eBusiness, also in the social context of healthcare, the disruption of internet technology has become a reality in eHealth, and the interest in business model innovation has arisen. In table 3 the case characteristics of our sample are described. In all three cases a modelling method is developed, inspired by the modelling methods from literature.

Table 4. Sample of experiments in modelling business models for eHealth services

Experiment Case	Social Context	Design Challenge	Modelling method	Co-modellers
<p>Telecom foundation NL (Vis, 2012)</p>	<p>Non-profit organisations supporting Hearing Impaired People (HIP). For HIPS many of the new mobile communication technology have the potential to improve the quality of life and self-confidence by increasing independency and decreasing uncertainties.</p>	<p>Earlier telecom projects for HIP people lead to some interesting service concepts, but many lacked a clear business model. To design a business model for the HIP in a network of the Telecom Foundation, Telecom business units, government, suppliers and non-profit organizations.</p>	<p>Free-format sketching inspired by actors and activity mapping techniques.</p>	<p>19 participants • 6 HIPs • 3 HIP organisations • 3 Software developers • 7 Telecom managers</p>
<p>Mental Healthcare institutes in Colombia and Netherlands (Nino & Ruiz, 2012)</p>	<p>Mental healthcare Institutions who provide treatment services ranging from drug abuse rehabilitation to hospitalization and monitoring of bipolar disorders. Telemonitoring for mental health care service delivery at home and at the institution. Comparative case experiment in Colombia and The Netherlands</p>	<p>Exploring Telemonitoring opportunity in mental health care service delivery by use of new technologies within an integrated system of wider care, services, resources and processes. The main design challenge was to identify business models for customer-centred eHealth and in particular to explore and design exchange relations in a network of health care organizations and actors.</p>	<p>Net transaction tool combining the Human Centred Design toolkit and the Net-Map tool</p>	<p>8 participants • 4 formal caregivers • 2 informal caregivers • 2 patients</p>
<p>Health & Wellbeing company (Griffioen, 2012)</p>	<p>Heart failure (HF) is one of the major diseases in West-Europe with prevalence between 1-2%. Between 47-70% of all healthcare costs for HF are due to hospitalisation including readmissions. Telemonitoring is focussed to keep patients out of the hospital and avoid readmission and therefore could cut back on the largest cost for HF disease management.</p>	<p>The design challenge is to investigate the 'service design' of heart failure management. HF disease management is a complex context involving several stakeholders including the HF patient, General Practitioner (GP), GP assistants, specialists (cardiologists) and HF nurses. Also involved are hospitals, municipalities and relatives. The second design challenge is to gather insights into the daily practice of HF disease management. And thirdly the modelling of business models is the major design challenge.</p>	<p>Value transaction map inspired by the Human Centred Design Toolkit and the activity mapping tools for creating a context map and personal journey are adjusted to the transaction element of a business model.</p>	<p>19 participants: • 5 HF Patients • 4 Relatives • 2 GPs • 1 Practice Nurse • 2 Cardiologists • 5 HF Nurses in 3 hospitals</p>

Co-modellers

Creating value in social network contexts is not so much an activity of an individual designer but moreover requires a broader skill set of knowledge. As experienced in many cases the real experts on a certain topic are the people in the community. For understanding and framing the problem of new business models, mobilizing the input of knowledge to complex problems of social networks makes sense. A growing number of experiments evidence the benefits of stimulating the creative abilities of local communities to co-design a solution. The new social context is often framed within local networks of actors. These actors can participate directly or indirectly in the design of solutions.

Modelling methods

In the development of our modelling methodology we identified three modelling methods in the design literature (see table 3).

Table 3. Modelling Methods of Transactions

Modelling Method	Key reference	Aim	Visual thinking objects
Actor map	Morelli (2007) Schiffer, E. & Hauck J. (2010) Net-Map	to visually capture connections, monitor and evaluate situations with many stakeholders who ' influences" potential outcomes.	An actor map, depicts the transactions between actors in a network. For example the Net-Map tool is based on defining roles of influencers, stakeholders, and moreover to address the network situation of HOW and WHY stakeholders are linked. This methods is interview-based.
Role map	IDEO (2010) - Human Centred Design toolkit.	encourage to design by empathy through taking a viewpoint on the situation from different perspectives.	Supports the identification of stakeholders in a network or community, as key holders of insights and clues for system solutions. holds desirability "Lenses" as the "community driven discovery" lens.
Activity map	Bitner, Ostrom & Morgan (2008) Stickdorn & Schneider (2010)	to generate customer insights or for designing a service.	activities of an example customers are mapped in interaction with employees and professionals of different organisations. In most cases infographics or photo's provide the visual elements to illustrate the activities.

So far, although these methods model transaction relations, these modelling methods are not specifically used for modelling business models. In our field experiments we took this methods as a reference for further adjustment, combinations and (re-)invention.

Three artefact examples in modelling business models for eHealth services

1. Modelling of business models for dedicated mobile telecom service for Hearing Impaired People (Vis, 2012)

In this case experiment the strategic designer used free-format sketching inspired by actors and activity mapping techniques. In a real time setting of a meeting with two actors from two companies. This free-format sketching method starts with a blanco A4 paper and pencil and markers.

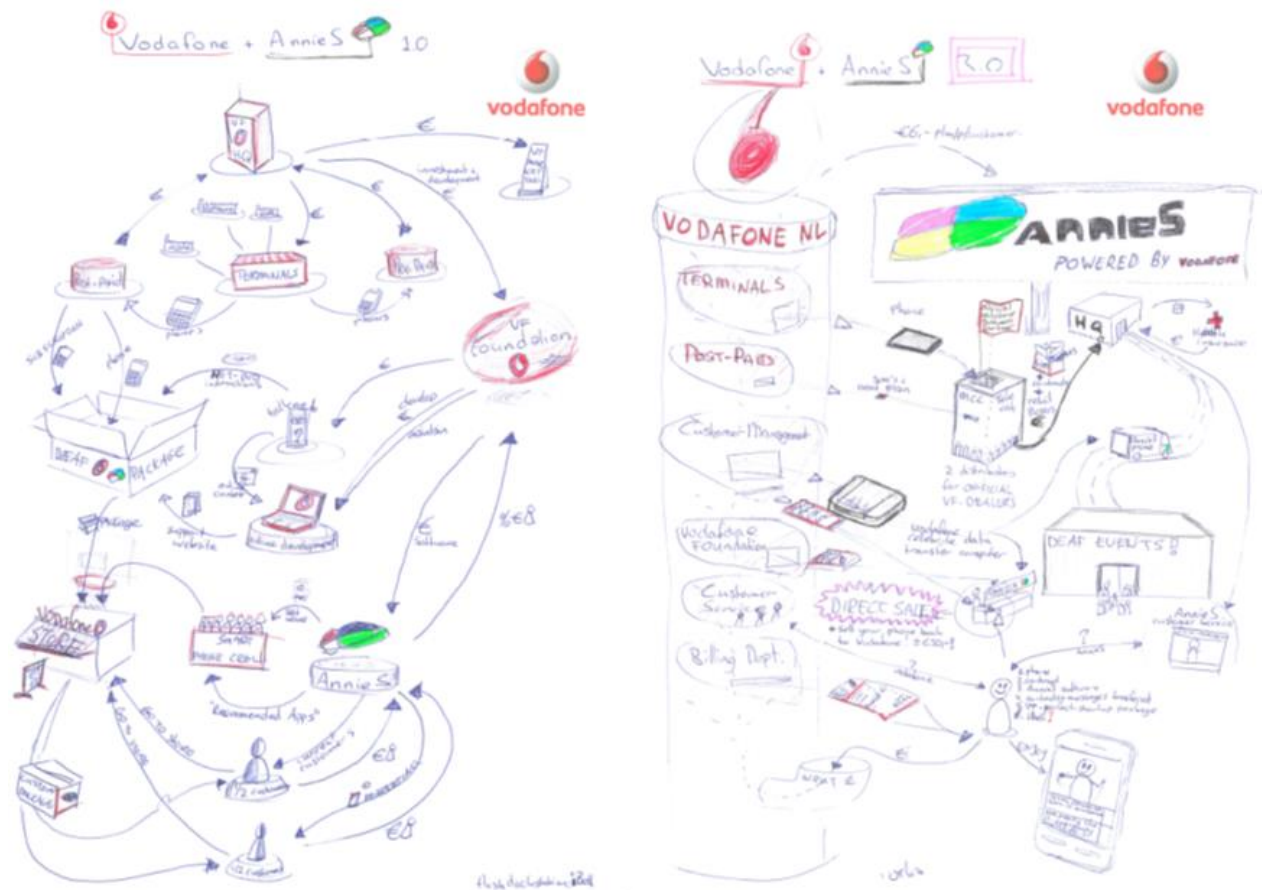


Figure 1. Business modelling for mobile telecom service designed for hearing impaired people, (Vis, 2012)

The purpose is to draw the model by hand, related to the oral explanations in the meeting. The drawing starts with the logos of the two companies and a drawing of the customer, in this case a HIP. So visually each stakeholder is given an own starting point from where they

can explore their position in talking about explicit scenarios of building up a value proposition for the customer. By drawing the flows of money, products and information it is possible to visualize a value proposition, and also the needs and doubts in an easy way. A first sketch of a complex business model was drawn in about 10 minutes. After this first sketch individual stakeholders were visited to do a reality check.

Each stakeholder provides feedback and detailed info on how to organize the process flows in the business model. Such as, top managers looked at the flows going in and out from the headquarters, and shop owners looked with specific attention to the flows going in and out of their shop. The sketches could easily be changed and simplified by taking the pen and adding or scrapping lines and parties. Actors were invited to directly participate in modelling. After every two or three meetings the strategic designer sketched a new version of the business model. Eventually, the business model for HIPs was sketched in 4 iterations: from a complex model where existing logistics needed mayor modification and collaboration with the new business partner, to a model where existing logistic flows of both companies get a minor addition. This model led to an agreement of partnership and within two months a new service for the HIP was launched and communicated broadly.

2. Modelling of business models for Mental eHealth Services (Nino & Ruiz, 2012)

In this experiment, a new designerly tool was devised by combining the Human Centred Design toolkit and the Net-Map tool used in field studies. The strategic designers prepared two specific templates in advance that could also be used on an iPad: one for patients and informal care giver (Familiar-Loved one) and one for a formal care giver (Specialist, Therapist, Nurse). To start, the interviewees received the templates an additional instructions sheet and four colour makers. They were invited to: 1. Identify and name main actors, 2. Create and draw link relations with arrows of different colours, 3. Note degree of satisfaction or investment with the service you are receiving by ‘colouring the dots’. From the individual datasheets an aggregated visualization was developed that could be contrasted between the formal and informal caregivers. The transaction mapping was visualized separately and the relations and the level of satisfaction or investment were grouped by type

of relation among the different groups as seen in figure 2. The amount of arrows repeated between stakeholders” shows a stronger relation.

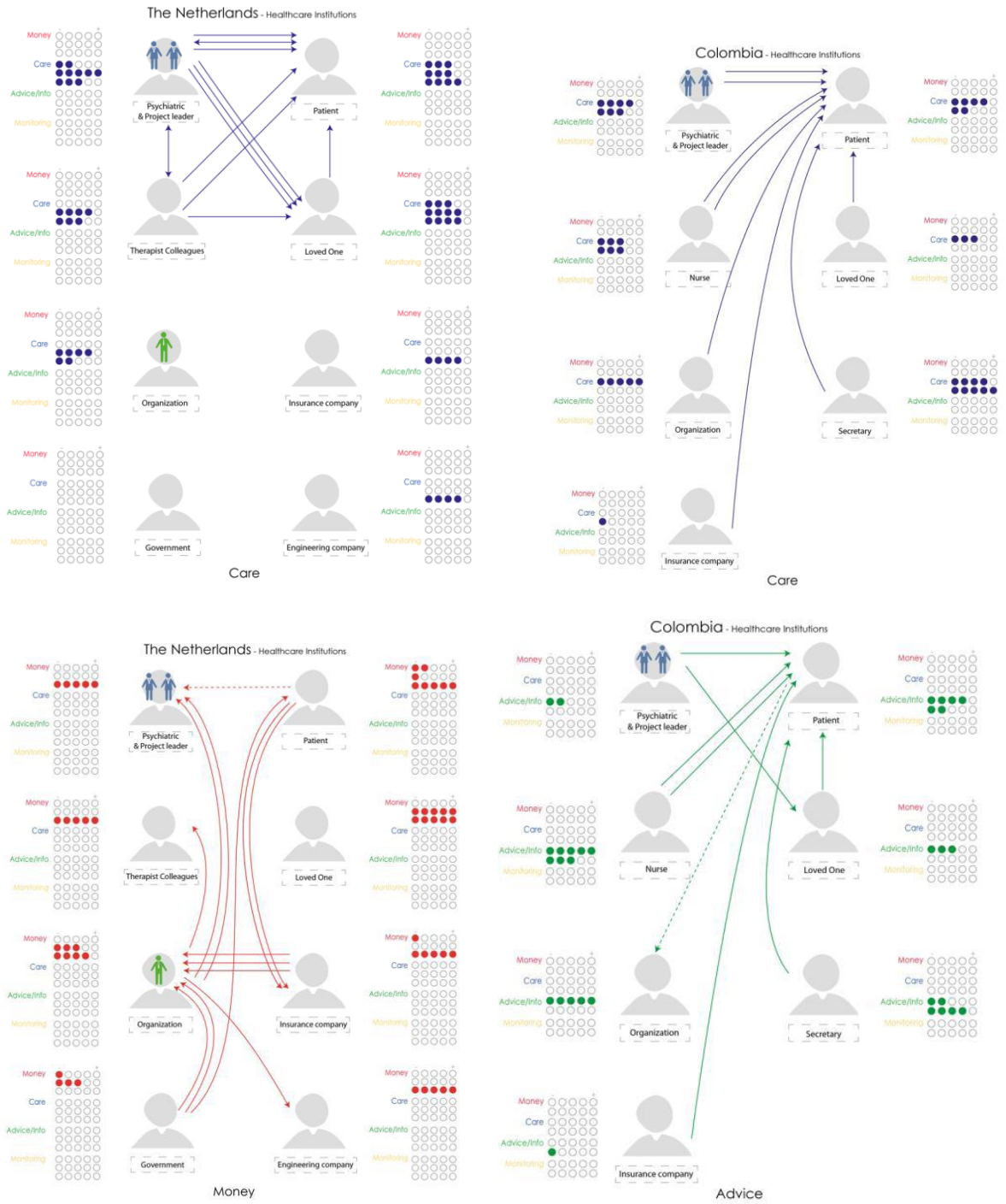


Figure 2. Net transaction model (Nino & Ruiz, 2012)

The arrowhead points the receiver in the relation, which can be both sided and dotted lines shows a weak or missing relation perceived by the respondents. The level of satisfaction or investment was translated into percentages to support the visual analysis in figure 2.

3. Modelling of Business Models for eHealth Services For Heart Failure Patients (Griffioen, 2012)

The value transaction mapping tool that we designed in this case is inspired by the ‘IDEO Human Centred Design Toolkit’ and the activity mapping tools for creating a context map and personal journey are adjusted to the transaction element of a business model. The purpose of the value transaction map tool is to communicate roles and transaction relations. For this type of mapping a set of actors’ cards and a concentric context map with the HF-patient in the middle was designed. Actors are either represented with an infographic of a person or a building, representing an organisation as actor. In this case these cards represent actors in HF disease management. The set includes cards representing the HF patient, relatives, GPs, GP assistants, specialists and HF nurses. Furthermore the organisation actors’ cards represent insurers, the government, municipalities and employees. In addition the set includes blanco cards for additional actors that are mentioned in the conversation.

This modelling starts with a blanco A3 paper, colour markers and the set of actor cards and the concentric stakeholders map. The interviewee is invited to map the actors and the transactions by drawing relations of: care providing, emotional relation, financial flow and other influence or relations of providing information and advice. Different actors were invited to create visual maps and diagrams: asking patients, relatives, GPs, specialists and HF nurses. Drawn from the raw data maps eHealth service scenarios were mapped.

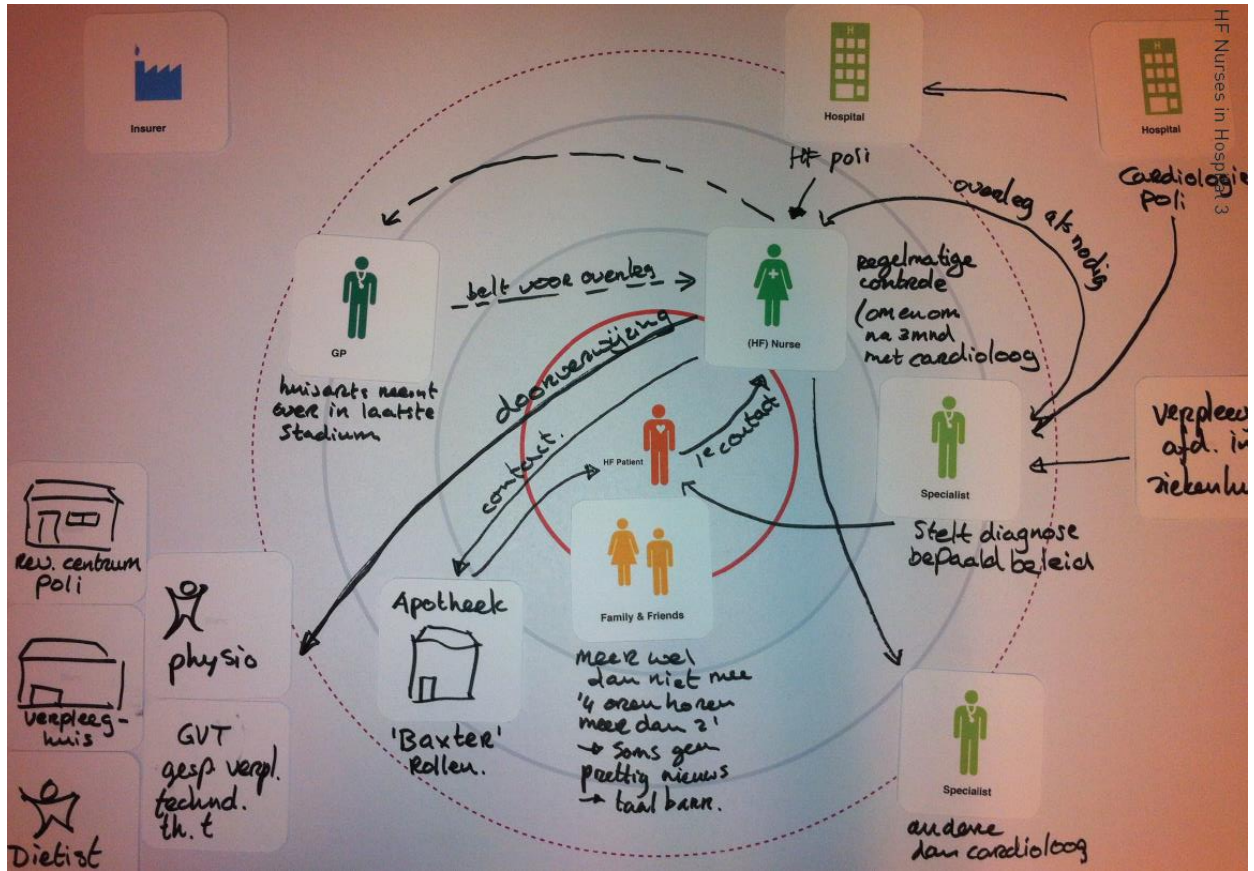


Figure 3. Scenario's for telemonitoring business model owners in the Netherlands (Griffioen, 2012)

Synthesis of design methodology for modelling business model design

In sum of the above reported case experiment results, the overview of table 5 compares some modelling elements. Typical, in each case experiment each designer, designed his, her own modelling method. To determine which method is more effective in which situation, more data gathering on the use of modelling methods is needed, and therefore a topic for future research. Overall, the experiments have in common that designing a modelling method is part of the modelling methodology of a business model.

Table 5. Overview of modelling approaches for business model design

Modelling Method	Visual thinking method	Symbol design	Transactions modelling	Co-modelling	Experiment Case reference
Free-format sketching	Sketching from actors point of view of desired transactions. Sketches are flexible and meaningful for the actors involved	Hand drawing of logo's, Customer and value chain elements like Distribution centre, Store etc.	Four types: -Service proposition elements: mobile phones, software package, box package, manual etc.: -Money flows -Information flows -Transportation flows.	Designer draws input form two partners. Designer draws detailed input form experts for reality check with experts	Telecom foundation NL (Vis, 2012)
Net transaction tool	Separate analysis views per transaction provide overview	Prefab actor icon ("puppets") on template and infographics dedicated to eHealth network of formal and informal caregivers.	Four types: - Care Service - Money - Advice/Info - Monitoring	Arrows in single prefab template	Mental Healthcare institutes in Colombia and NL (Nino & Ruiz, 2012)
Value transaction map	Demarcation of business model domain, context modelling of value proposition.	Cards with infographics of people and buildings dedicated to HF disease-management. Reusable for other types of maps.	Four types of transactions: - care providing - emotional relation - financial flow - influence relations of information and advice.	Co- modelling a value network efficient in time	Health & Wellbeing company (Griffioen, 2012)

In reflection during and after the production of the artefacts, we can define an initial design methodology. From the artefact examples and experimentation with modelling approaches, the design activities are:

- A. **Social Network Analysis:** identification of stakeholders, in terms of business model characteristics *resources* becomes *network actor*.
- B. **Framing Customer Value:** customer centric problem identification, latent need analyses.
- C. **Design modelling tool:** get inspired by modelling methods and prepare a modelling tool with symbols such as firm logo's, actors, buildings etc. tailored to elements from the social network analysis. For example visuals for GP, ICT-manager, shop and Hospital buildings. Prepare templates, infographic cards, maps of prescriptive stages of transactions and consequences.
- D. **Designing Business model together with co-modellers:** invite interviewee or workshop group to participate in modelling after introduction on aim and context of business modelling exercise. Use modelling tool with sketching, diagrams and drawing. for visual thinking on business model elements. Model *transactions* by flows of value, finance and also flows of emotional and informational advice exchange .
- E. **Model business model artefact:** produce end result of a business model artefact, validate the model with the actors and revise and detail the business model.

Through experimentation with the different modelling methods we are able to reframe the challenge of modelling business models one step further: *Modelling actors, perspectives and value transaction in a network structure of activity transactions*. In such a way that the value proposition and profit formula are appropriate and acceptable.

Discussion

In this paper we have discussed a research project centred on the development of a methodology for modelling business model design. The first half of the paper viewed at some of the existing theory that legitimates the methodology developed in the second half.

Rather than discuss well known business model elements, we have tried to indicate some of the practical problems encountered during designing and modelling of business model in our research. As demonstrated with the modelling approaches in the experiments, business model design is not concerned with the detailed level of business process redesign that sketches workflows and organization structures but on the level of network exchanges by relational contracts. Casadesus-Masanell and Ricart (2009) stress that it is important to simplify the representation of the business models into main categories to be able to work with it from a high level perspective; avoiding detailing allows a business model to remain flexible. To this respect the process design of transactions in business models are closer related to value chains and value networks.

Like most research by design projects, this one is limited to the demonstration of artefact examples and modelling approaches. The limitation includes this initial exploration with theoretical grounding. Exploration results like those presented in this paper, lead to more research directions for further research and validation with other types of research. As major direction for further research and practice we propose to continue in experimentation of modelling to provide a broader base for the evaluation of strength and weaknesses. Improvement directions for the design methods of modelling are: a) increase transparency of transaction modelling and b) aggregation possibilities between contexts, organisations of networks, firms and teams. These directions are regarded as a challenge by the research team, which is actively planning phase 2 of the research program.

References

- Afuah A, & Tucci C.L (2001). *Internet Business Models and Strategies: Text and Cases*. McGraw-Hill, Boston.
- Amit, R. & Zott, C. (2001). Value creation in e-business. *Strategic management journal*, 22: 493–520.
- Baden-Fuller, C. & Morgan, M. (2010). Business models as models. *Long Range Planning*, 43 (2-3):156–171.
- Bitner, M.J., Ostrom, A., & Morgan, F. (2008). Service blueprinting: A practical technique for service Innovation. *California Management Review*, 50(3): 66-94.
- Chesbrough, H. (2010). Business Model Innovation: Opportunities and Barriers. *Long Range Planning*, 43: 354-363.

- Cross, N. (1982). Designerly ways of knowing. *Design Studies*, 3/ 4: 221-227
- Cross, N. (2001). Designerly Ways of Knowing: Design Discipline Versus Design Science. *Design Issues*, 17/ 3: 49-55.
- Casadesus-Masanell, R. and Ricart, J. E. (2009). From Strategy to Business Models and to Tactics. *Long Range Planning conference on business models 2008*, Cass Business School, London.
- Demil, B. & Lecocq, X. (2010). Business Model Evolution: In Search of Dynamic Consistency. *Long Range Planning*, 43:227–246.
- Doganova, L. & Eyquem-Renault, M. (2009). What do business models do? Innovation devices in technology entrepreneurship. *Research Policy*, 38 (10), 1559–1570.
- Goldschmidt, G. (1994). On visual design thinking: the vis kids of architecture. *Design Studies*, 15 /2: 158-174.
- Hienert, C., Keinz, P., Lettl, C. (2011). Exploring the nature and implementation process of user-centric business models. *Long Range Planning*, 44 (5-6): 344-374.
- Schiffer, E. & Hauck J. (2010). Net-Map: Collecting Social Network Data and Facilitating Network Learning through Participatory Influence Network Mapping. *Field Methods*, 22(3) 231-249
- Galbraith J.R. (1977). *Organization Design*. Addison Wesley Publishing.
- Gulati R. (1999). Network location and learning: the influence of network resources and firm capabilities on alliance formation. *Strategic Management Journal* 20(5): 397–420.
- Griffioen E. (2012). *Business Model Design for the Healthcare sector. Sustainable Business Model Design for the Heart Failure Home Telemonitoring Opportunities in Western Europe*. Delft University of technology-Industrial Design Engineering Faculty: Master Thesis Strategic Product Design -2012-09-25.
- Hedman, J. & Kalling, T. (2003). The business model concept: theoretical underpinnings and empirical illustrations. *European Journal of Information Systems* 12: 49–59.
- Hilpinen, R. (1992) On artifacts and works of art. *Theoria* 58, 58-82.
- Johnson, M.W., Christensen, C.M. & Kagermann H. (2008). Reinventing your Business Model. *Harvard Business Review*, December (2008):50-59.
- Johnson, M.W. (2009). *Seizing the White Space*. Boston: Harvard Business School Press.
- IDEO (2010) - *Human Centred Design toolkit*. IDEO.
- Kim, W. C. and Mauborgne, K. (2000). Knowing a winning business idea when you see one. *Harvard Business Review*, September:129-137.
- Mahadevan, B. (2000). Business models for Internet-based eCommerce: an anatomy. *California Management Review*, 42(4): 55–69.
- McGrath, R.G. (2010). Business Models: A discovery driven approach. *Long range planning*, 43(2): 247-261.

- Markides, C. (2006). Disruptive Innovation: In Need of Better Theory*. *Journal of Product Innovation Management*, 23:19–25.
- Morelli N. (2007). Social Innovation and New Industrial Contexts: Can Designers “Industrialize” Socially Responsible Solutions?”. *Design Issues*, 23/94: 3-21.
- Nino, L. & Ruiz C. (2012). *Mapping customer-focussed business models for eHealth: a caring network*. Paper resulting of the Strategic Product Design Research Master course. Delft: TU Delft Industrial Design Engineering Faculty.
- Ostenwalder, A., (2004). *The Business Model Ontology: a proposition in a design science approach*. Institut d'Informatique et Organisation. Lausanne, PhD Thesis.
- Ostenwalder, A., Pigneur, Y. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. John Wiley & Sons- 288 pages.
- O'Reilly, T. (2007). What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software. *Communications & Strategies*, 65, 1st quarter: 17-37.
- Pateli, A. G., & Giaglis, G. M. (2004). A research framework for analyzing eBusiness models. *European Journal of Information Sciences*, 13:302–314.
- Sabatier, V., Mangematin, V. & Rousselle, T. (2010). From recipe to dinner: business model portfolio in the European biopharmaceutical industry. *Long Range Planning*, 43 (2): 431–447.
- Sharma, A. (2012). Designing Empowerment : Design Thinking For Social Impact. *DMI Research Conference Boston* August 3-5, 2012.
- Schön, D.A. (1983). *The Reflective Practitioner. How Professionals Think In Action*. The Perseus Books Group.
- Simonse L.W.L., Zonneland J., Qiwen Liu,K., Govers, F., Vincent, R., Laban, V., Grau Jensen, M., Van Roest. I., Hulsebosch, M., Hilbolling, S. & Voorend, M., (2011) Design Research on Business models in Home Healthcare. *Tsinghua-DMI International Design Management Symposium Hong Kong*, December 3-5 , 2011.
- Simonse, L., Vis, S., Griffioen, E. Nino, L., Ruiz, C. Crossley Urrego, A. & Soto Camacho, G. (2012). Mapping Business Models For Social Service Design In Healthcare. *DMI Research Conference Boston*, August 3-5, 2012.
- Simon, H.(1973). The structure of ill-defined problems. *Artificial Intelligence*, 4(3):181-201.
- Stickdorn, M., & Schneider, J. (2010). *This is Service Design Thinking*. Amsterdam: BIS Publishers.
- Timmers P. (1998). Business models for electronic markets. *Electronic Market* 8 (2), 2–8.
- Teece, D. J. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, 43(2-3):172-194.
- UNICEF (2012). *Playbook*, p.2.:mobilemandate.frogdesign.com/pdf/UNICEF_playbook.pdf
- Vis, S. (2012). *Mobile Communication for Everyone* - Vodafone Netherlands Foundation.

Delft University of Technology-Industrial Design Engineering Faculty: Master Thesis
Strategic Product Design -2012-05.

Zott C. & Amit R. (2007). Business model design and the performance of entrepreneurial firms. *Organization Science*, 18: 181-199.

Zott C. & Amit R. (2008). The fit between product market strategy and business model: implications for firm performance. *Strategic Management Journal*. 29: 1-26.

Zott C. & Amit R. (2010). Business Model Design: An Activity System Perspective. *Long Range Planning*, 43 (2010): 216-226.