Modeling Business Models
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Introduction

Business model design does not always produce a "design" or "model" as the expected result. However, when designers are involved, a visual model or artifact *is* produced. To assist strategic managers in thinking about how they can act, the designers' challenge is to combine both strategy and design notions. The intent of this article is to gain a better understanding of the modeling methods that can be used.

In the discipline of design research, business model design began to draw attention at our conferences (e.g., Design Management Institute, Design Research Society and The Design Society) mostly through scholar–practitioner interaction with the design agencies. Although we have begun to build designerly knowledge on business models, a gap remains to be filled on generating business models and the theoretical underpinning of this new type of modeling. To contribute here, we advance the business model concept in strategic design management with the modeling aspects identified by McGrath (2010):

> Modeling a business is considered to be a useful approach for 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 models.[1]

Designers are increasingly engaged in experiments with the design of business models. Modeling a business has arisen as a new area of practice for strategic product designers, as well as design researchers. In particular, in the new social contexts of designing value for improving lives, beyond the design of products and beyond the mass production economics,[2] business model design has emerged as a new domain in design.

Most notably, design agencies have explored the new terrain of business model design in the context of social services. The IDEA award-winning project of Frog, in collaboration with

1   From Rita Gunther McGrath, "Business Models: A Discovery Driven Approach," *Long Range Planning* 43, no. 2–3 (2010): 247–61.

2   The entry into a new era of social design is addressed by Victor Margolin and Sylvia Margolin, "A 'Social Model' of Design: Issues of Practice and Research," *Design Issues* 18, no. 4 (2002): 24–30; and by Nicola Morelli, "Social Innovation and New Industrial Contexts: Can Designers 'Industrialize' Socially Responsible Solutions?" *Design Issues* 23, no. 4 (Autumn 2007): 3–21.

3   For examples of social business model design by Frog Design for UNICEF, see the 2012 UNICEF Playbook (page 2): mobilemandate.frogdesign.com/pdf/UNICEF_playbook.pdf (accessed February 18, 2012). See also Akshay Sharma, "Designing Empowerment: Design Thinking for Social Impact" (paper presented at the Research Conference of the Design Management Institute (DMI), Boston, August 3–5, 2012). Efforts to build on the BOP solutions of Grameen were documented in C. K. Prahalad, *The Fortune at the Bottom of the Pyramid* (Upper Saddle River, New Jersey: Wharton School Publishing, 2004). Insights also are reported in Muhammad Yunus, Bertrand Moingeon, and Laurence Lehmann-Ortega, "Building Social Business Models: Lessons from the Grameen Experience," *Long Range Planning* 43 (2010): 308–25.

4   The profit formula is conceptualized by Mark W. Johnson, Clayton M. Christensen, and Henning Kagermann, "Reinventing Your Business Model," *Harvard Business Review* (December 2008): 50–59; the price model is conceptualized by W. Chan Kim and Renée Mauborgne, "Knowing a Winning Business Idea When You See One," *Harvard Business Review* (September 2000): 129–37.

5   As the CEO and leader of IDEO's Social Innovation group, Tim Brown and Jocelyn Wyatt describe in "Design Thinking for Social Innovation," *Stanford Social Innovation Review* (Winter 2010): 30-35. See also www.ideo.com/expertise/business-design/ (accessed October 24, 2012).

6   On entering new design fields, see Richard Buchanan, "Design Research and the New Learning," *Design Issues* 17, no. 4 (Autumn 2001): 3-23.

7   Ramon Casadesus-Masanell and Joan Enric Ricart, "From Strategy to Business Models and on to Tactics," *Long Range Planning* 43, no. 2–3 (2010): 195–215.

UNICEF, is illustrative. In this project a new business model was designed for community health services for women and children in rural and underserved areas in Africa.

Another noteworthy example that demonstrates empathic and creative problem solving in designing new propositions with breakthrough profit formulas is the microcredit service solution of LAXMI in India. In this project the "bottom of the pyramid" (BOP) solution of Grameen is advanced with tools for woman who cannot read or write which eliminated the accountant's fee (about 20%).[3] This business model design shows that finance is an important element in combination with realizing value for improving lives. The economic logic behind the provision of this value—the so-called profit formula, or the price-model[4]—is part of modeling value exchange in business models. Building on similar BOP projects, IDEO now promotes the novel expertise of *business design* that *combines design thinking and traditional corporate strategies,* not only for BOP contexts but also for a broad range of social services and even for the familiar industrial terrains.[5]

From these examples of practice, we argue that professional strategic designers conceive the design of business models as our field of expertise. In accordance with Buchanan, strategic product designers are in a position to work in new social contexts of human experience, in which they design business models by applying design thinking.[6] In keeping pace with the changing social roles of industries that are transforming from merely product production to providing far-reaching service solutions, designers can provide these solutions and design business models that affect social relations to a greater extent.

In the following paragraphs, we first elaborate on the historic conception of the construct of a business model and the current lack of knowledge on actually modeling a business model. We then ground modeling in design theory as a backbone for our experimental approach. Furthermore, we introduce three types of design toolkits, on which we have built our modeling experiments. We conclude with three case examples of experiments with business modeling in the social context of eHealth.

eBusiness Model Origins
Casadesus-Masanell and Ricart have pointed out that "the exercise of designing new business models is closer to an art than to a science."[7] We reviewed the literature in search of research contributions that address the art of modeling a business model and traced the origins of the business model construct back to the start of e-business start-ups. For the understanding and explanation of this new phenomenon of e-business, three theoretical perspectives have been developed.

In the first perspective, which relates most strongly to the origins of the business model concept in e-business, the research contributions concentrate on describing the innovative features and characteristics of models enabled by Internet technologies to define taxonomies of e-business models.[8] For example, model classifications include e-shop, e-procurement, e-auction, e-mall, third-party marketplace, virtual community, value-chain service provider, value-chain integrator, collaboration platform, and information brokerage. This theoretical perspective is mainly based at the intersection of information systems and strategic management and is also the perspective on which Osterwalder has built a business model ontology. He first applied the information systems design method and later composed the community-based book "Business Model Generation," introducing the business model canvas with building block elements.[9] This canvas has gained considerable popularity in the design community. To some extent this canvas appears to be useful for the analysis and overview of business model elements. It frames the standardized elements of a business model. However, just as a SWOT (strengths/weaknesses/opportunities/threats) canvas does not model a strategy, neither does this canvas model the business model. The standardized elements are neither connected by transactions, nor visualized by a model structure that uniquely identifies the business model.

The second perspective focuses most heavily on building a new business model theory from the e-business disruption. Amit and Zott analyzed e-business cases and found new characteristics that could not be sufficiently explained by existing theories. For example, through the use of Internet technology, more connections with complementary partners are enabled, fostering new forms of collaboration, or new propositions of bundled services, software, and hardware products lead to locked-in value propositions (e.g., Apple's iTunes platform). They also found that the Internet technology in the new business models leads to an increased efficiency of coordination that affects the transaction costs between partners. Based on these insights, Amit and Zott came up with a definition for a business model that has been 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.[10]

This construct of a business model was originally distinguished from the conventional theories of value chain, resource-based view, network theory, transaction theory, and innovation theory.[11] Later on, theory contributions concentrated on integrating and connecting business models with classical managerial concepts, such as product market strategy, competitive advantage,

8   This theoretical perspective lies at the intersection of information systems and strategic management. See Paul Timmers, "Business Models for Electronic Markets," *Electronic Market* 8, no. 2 (1998): 2–8; B. Mahadevan, "Business Models for Internet-based eCommerce: an Anatomy," *California Management Review* 42, no. 4 (2000): 55–69; Tim O'Reilly, "What Is Web 2.0? Design Patterns and Business Models for the Next Generation of Software," *Communications and Strategies* 65, (1st quarter 2007): 17–37. See also contributions by Jonas Hedman and Thomas Kalling, "The Business Model Concept: Theoretical Underpinnings and Empirical Illustrations," *European Journal of Information Systems* 12 (2003): 49–59; and Adamantia G. Pateli and George M. Giaglis, "A Research Framework for Analyzing eBusiness Models," *European Journal of Information Sciences* 13, no. 4 (2004): 302–14.

9   Alexander Ostenwalder "The Business Model Ontology: A Proposition in a Design Science Approach" (PhD thesis, Lausanne, Institut d'Informatique et Organisation, 2004) and Alexander Ostenwalder and Yves Pigneur, *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers* (Hoboken, New Jersey: John Wiley, 2010).

10   In Raphael Amit and Christoph Zott, "Value Creation in eBusiness," *Strategic Management Journal* 22, no. 6–7 (2001): 493–520.

11   See Allan Afuah and Christopher L. Tucci, "Internet Business Models and Strategies: Text and Cases" (Boston, McGraw-Hill, 2001). See also Amit and Zott (2001), above endnote 10.

12 This theoretical perspective is based on corporate strategy theory. See Christoph Zott and Raphael Amit, "Business Model Design and the Performance of Entrepreneurial Firms," *Organization Science* 18, no. 2 (2007): 181–99; Christoph Zott and Raphael Amit, "The Fit Between Product Market Strategy and Business Model: Implications for Firm Performance," *Strategic Management Journal* 29, no. 1 (2008): 1–26; Christoph Zott and Raphael Amit, "Business Model Design: an Activity System Perspective," *Long Range Planning* 43, no. 2–3 (2010): 216–26; D. J. Teece, "Business Models, Business Strategy and Innovation," *Long Range Planning* 43, no. 2-3 (2010): 172–94; Benoît Demil and Xavier Lecocq, "Business Model Evolution: In Search of Dynamic Consistency," *Long Range Planning* 43, no. 2–3 (2010): 227–46.

13 One of the classic works on organizational design is written by Jay R. Galbraith, *Organization Design* (Philippines: Addison Wesley Publishing, 1977).

14 Ranjay Gulati, "Network Location and Learning: the Influence of Network Resources and Firm Capabilities on Alliance Formation," *Strategic Management Journal* 20, no. 5 (1999): 397–420.

15 This theoretical perspective lies at the intersection of strategic management and innovation management. See Amit and Zott (2001) above endnote 14; Constantinos Markides, "Disruptive Innovation: In Need of Better Theory," *Journal of Product Innovation Management* 23, no. 1 (2006): 19–25; Johnson, Christensen, and Kagermann (2008) above endnote 7; Henri Chesbrough, "Business Model Innovation: Opportunities and Barriers," *Long Range Planning* 43, no. 2–3 (2010): 354–63; and Christoph Hienerth, Peter Keinz, and Christopher Lettl, "Exploring the Nature and Implementation Process of User-centric Business Models," *Long Range Planning* 44, no. 5–6 (2011): 344–74.

firm performance, and activity theory.[12] Unfortunately, a growing number of theory contributions is also blurring the business model concept into the corporate strategy theory and classical strategic management theory. These contributions might advance the business model construct with additional frameworks, but they also lead to an extended, broader interpretation and integration of the business model concept into the strategic approach of incumbent firms, eventually shifting into the direction of organization design and organizational change and transformation management.[13]

In contrast, the third theoretical perspective relates strongly to the startup contexts of the e-business model innovation. For design research contributions, we most closely connect to this third perspective on business model innovation, which arises at the intersection of strategic management and innovation management. This third innovation perspective concentrates on understanding the *network models* of e-business. Novel business models appeared to integrate the *network technology* and *strategic network* organizations into new business models.[14] For example, crowd sourcing is a novel type of value creation, beyond the classical product and process notions of innovation from Schumpeter. In this perspective, business model innovation allows for new inventions of creating value apart from the innovation of products or processes. It is evidenced by the patents that start-ups have received for their Internet-based business methods as unique intellectual property of a business model innovation. Well-known examples of such patented business models are Amazon's one-click method and Priceline's buyer-driven online reverse auctions. With the recognition of this separate subject category of patents, which is distinguished from the categories of subject matter (e.g., machines, articles of manufacture, and compositions of matter), business model innovation has become recognized as a new locus of innovation.[15] But what are the actual models of business, the artifacts created for these new business model innovations? How are these artifacts designed and modeled? And how is this activity supported with methods and tools? These questions have remained unanswered. The art of modeling a business model still needs to be explored and framed.

Building on the existing knowledge, and most closely on the theories of the third perspective, we seek to contribute to the field of design research in advancing the business models concept with modeling elements. 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, and in relation to network partners, including customers and non-profit organizations.[16]

Designing a business model refers in our view to the design of a value proposition that includes tactical and operational management decisions, such as the decisions regarding the profit formula of a business model. We build on the market innovation approach of Kim and Mauborgne, who introduced the "Business Model Guide" as a tool to build profitable business models by analyzing a price model in relation to cost targets and partner capabilities in the value network relations. The types of models they introduced include direct selling, leasing, time share, slice-share, and equity payment. These types of business model design lead to creating new markets with new customers. Because they span firm and industry boundaries, business model innovations involve 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 using a new design of a business model.[17]

Modeling from a Design Perspective

Cross identified *modeling* as the intellectual skill of designers, in contrast with experimentation in science and evaluation in art.[18] In the design tradition, models are the sketches and drawings of proposed design solutions, including computer-aided models. We build on this type of modeling, which is not to be confused with the "formal modeling" approaches of operational research that, according to Schön, demonstrate the limits of technical rationality, "failing to yield effective results in the more complex, less clearly defined problems of business management."[19] We thus use an intelligent action approach in our design research and reflect on business modeling during and after experimentation in the context of our cases. For modeling from a theoretical point of view, we build on Simon's notions of modeling a complex system:

> Modeling is a principal tool for studying the behavior 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.[20]

Inspired by the emergence of chaos theory and the notion of non-linearity, Simon argues to replace models used for prediction with models used for prescription. Prescriptive models are constructed to understand the consequences of opting for one decision over another. Prescriptive modeling provides insights on orders of magnitude, aggregates as much as possible, and uses symbolic

16 Lianne W. Simonse, Julie Zonneland, Kiki Qiwen Liu, Fleur Govers, Roland Vincent, Vincent Laban, Morten Grau Jensen, Irma Van Roest, Marjolein Hulsebosch, Susan Hilbolling and Mathijs Voorend, "Design Research on Business Models in Home Healthcare" (paper presented at Tsinghua-DMI International Design Management Symposium, Hong Kong, December 3–5, 2011).

17 Lianne W. Simonse, Sietse Vis, Evelien Griffioen, Laura Nino, Catalina Ruiz Arias, Andrea Crossley Urrego, A. and Gabriela Soto Camacho, "Mapping Business Models for Social Service Design in Healthcare" (paper presented at the DMI Research Conference, Boston, August 3–5, 2012).

18 Nigel Cross, "Designerly Ways of Knowing," *Design Studies* 3, no. 4 (1982): 221–27; and Nigel Cross, "Designerly Ways of Knowing: Design Discipline Versus Design Science," *Design Issues* 17, no. 3 (Summer 2001): 49–55.

19 Donald A. Schön, "The Reflective Practitioner: How Professionals Think in Action" (London: The Perseus Books Group, 1983), 44.

20 Herbert A. Simon, "Prediction and Prescription in Systems Modeling," *Operations Research* 38, no.1 (1990): 7–14.

modeling where appropriate. Aggregation refers to the artificial systems that have a "boxes-within-boxes" architecture; the important property is that the behavior of the units at any specific level can be described and explained without the need for a detailed picture of the structures and behavior at the levels below. Symbolic modeling makes use of symbols that represent natural language, pictures, or diagrams, rather than making use of numerical description.

Furthermore, when designers practice modeling, the language of designers is a visual and object language. We use symbols, signs, and metaphors through the media of sketching, diagrams, and drawings and thus translate abstract requirements into concrete objects, including 2D and 3D images, clay models and maquettes. The way we communicate as designers is through visual thinking, framing, and coding design requirements into new models. As Goldschmidt clarified:

> …in situations of the preliminary "front edge" of addressing a new design task, architects and designers think visually, and 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. In other words, architects quite often engage in sketching not to record an idea, which is not there yet, but to help generate it.[21]

By applying our abilities in generative modeling and visual thinking, we are open to new discoveries of business model inventions—if we can combine this way of modeling and thinking with clear synthesis and reasoning.

Building a Modeling Approach
In new social contexts, we make use of our design ability of modeling and visual thinking, for finding a balance between the technologically possible (an engineering approach) and the socially desirable (a user-oriented approach).[22] In most cases a toolset from a dedicated method guides these design efforts. The new contextual conditions of social service design also require a new methodological approach on the basis of which a new toolbox for designing business models needs to be defined.

An acknowledged way of designing a dedicated method is by adopting them from other fields and adjusting and combining these with tools that serve the designer's purposes. From the theoretical perspectives, we adopt and adapt the business model construct defined by Amit and Zott and the accompanying four-pronged analytical framework of Johnson.[23] We then combine

21 Gabriela Goldschmidt, "On Visual Design Thinking: the Vis Kids of Architecture," *Design Studies* 15, no. 2 (1994): 158–74.
22 Morelli (2007), endnote 3.
23   Mark W. Johnson, *Seizing the White Space* (Boston: Harvard Business School Press, 2009).

CUSTOMER VALUE PROPOSITION — **PROFIT FORMULA**

BUSINESS MODEL

RESOURCES — **PROCESESS**
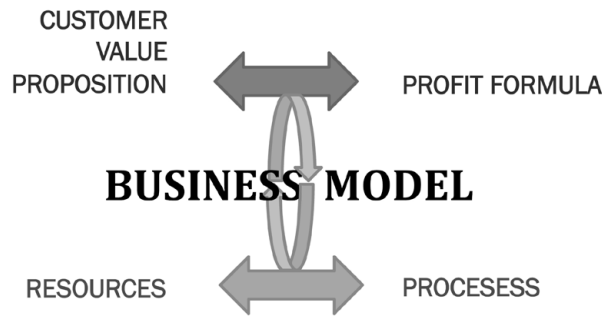
the construct and framework with designerly toolboxes to generate modeling approaches with which we can experiment in designing business models.

We start from the construct definition of a business model design provided by the strategists Amit and Zott as stated in the previous paragraph.[24] For a strategic product designer, the first element of interest in this business model construct is that it "depicts," which refers to the model as visual object. The second element of interest is its "structure," which refers to the form and model. The third element of interest in the business model construct is the "transactions" element, which appears to be the most challenging for constructing the business model. This element relates both to the network theory and to the economic theory of transactions. In light of Johnson's analytical framework, a transaction consequently refers to the exchange of a value proposition and the price that a customer pays for it. The framework relates business model innovation to business opportunities (see Figure 1). The secondary transactions connect the resources by processes and in this sense are process transactions between partners or between units made up of employees. In advancing these two concepts, we reframe the challenge of modeling a business model, now as *modeling value transactions with a network structure of process transactions.*

In further exploring the design research literature for methodological approaches that can be used to model this object of network structure and transaction relations, we found three types of toolkits that model network actors, roles, and activities:

- *Actor map:* An actor map depicts the transactions between actors in a network. For example, the Net-Map tool is based on defining the roles of influencers and stakeholders, and moreover, addresses the network situation of *how* and *why* stakeholders are linked.[25] This method is interview-based. The aim is to visually capture connections, and to monitor and evaluate situations with many stakeholders who "influence"

24   Amit and Zott (2001), endnote 10.
25   Eva Schiffer and Jennifer Hauck, "Net-Map: Collecting Social Network Data and Facilitating Network Learning Through Participatory Influence Network Mapping," *Field Methods* 22, no. 3 (2010): 231–49.

potential outcomes. This generic field study method has been used in analytical approaches but might have the potential for adaptation into a designerly modeling approach, as designers interactively shift from the logical space of problem analysis to the solution space.

- *Role perspectives:* A role perspective tool supports the identification of stakeholders in a network or community as key holders of insights and clues for system solutions. For example, the Human Centered Design toolkit of IDEO, which holds desirability "lenses" (e.g., the "community driven discovery" lens) and encourages design by empathy through intentional adoption of different viewpoints on the situation.[26]
- *Activity maps:* An activity map makes use of info graphics or photos to illustrate the activities. For example, the tool of a "customer journey" to generate customer insight and to design a service.[27] In customer journeys, the activities of sample customers are mapped in interaction with those of employees and of professionals of different organizations. Another example of such an approach is service blue printing.

To further develop a modeling approach for a business model, we experimented with these tools, combining, adjusting, and inventing new modeling methods for strategic business models.

Co-Modeling
Creating value in social network contexts in new services is not so much an activity of an individual designer as it is a cooperative effort because it requires a broader skill set. As experienced in many cases, the real experts on a certain topic and those with the most insight for a design challenge are the people in the community, or the end customers. To understand and frame the problem of new business models, it makes sense to mobilize the input of knowledge on complex problems from social networks. 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. Identifying the appropriate actors is critical in exploring the full context of interests, skills, and (tacit and explicit) knowledge that can be mobilized.

26 IDEO, *Human Centred Design Toolkit* (Stanford: IDEO, 2010), www.ideo.com/images/uploads/hcd_toolkit/IDEO_HCD_ToolKit.pdf (accessed March 8, 2012).

27 See, e.g., Marc Stickdorn and Jakob Schneider, *This Is Service Design Thinking* (Amsterdam: BIS Publishers, 2010); and Mary Jo Bitner, Amy L. Ostrom, and Felicia N. Morgan, "Service Blueprinting: A Practical Technique for Service Innovation," *California Management Review* 50, no. 3 (2008): 66–94.

Table 1 | Sample of experiments in modelling business models for social service Design with eHealth solutions

Experiment Case	Social Service Context	Modeling method	Co-modellers
Telecom foundation NL (Vis, 2012)	Non-profit organizations 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.	Free-format sketching inspired by actors and activity mapping techniques.	19 participants • 6 HIPs • 3 HIP organizations • 3 software developers • 7 telecom managers
Mental healthcare institutes in Colombia and Netherlands (Nino and Ruiz, 2012)	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	Net transaction tool combining the Human Centered Design toolkit and the Net-Map tool	8 participants • 4 formal caregivers • 2 informal caregivers • 2 patients
Health & Wellbeing company (Griffioen, 2012)	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 hospitalization including readmissions. Telemonitoring is focused to keep patients out of the hospital and avoid readmission and therefore could cut back on the largest cost for HF disease management.	Value transaction map inspired by the Human Centered 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.	19 participants • 5 HF patients • 4 relatives • 2 general practices • 1 practice nurse • 2 cardiologists • 5 HF nurses in 3 hospitals

Three Experiments in Modeling Business Models for e-Health

With three experiments, we aim to open up the black box of the process of creating business models and look at what is actually modeled. In each experiment, one or two strategic product designers experimented with the different type of designerly toolkit in the field of eHealth. As in e-Business contexts, so in the social context of healthcare: The disruption of internet technology has become a reality in e-Health, and the interest in business model innovation has increased (see Table 1).

Business Modeling for Mobile Telecom Service Designed for Hearing Impaired People[28]

Social context: Almost 10% of the world's population lives with some kind of disability: limitations in vision, hearing, or dexterity. Meaningful developments are being made in mobile communication technology for hearing impaired people. Many of these

28 Sietse Vis, *"Mobile Communication for Everyone: Vodafone Netherlands Foundation"* (Masters' thesis Strategic Product Design, Delft University of Technology, Faculty of Industrial Design Engineering, 2012).
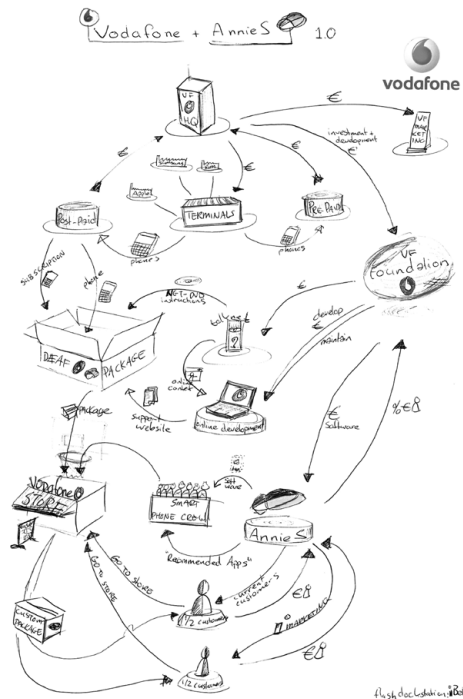
Figure 2

Business modeling for mobile telecom service designed for hearing impaired customers, Vis (2012).

products have the potential to improve quality of life and self-confidence for these people by increasing their independence and decreasing uncertainties.

Design challenge: In exploring project results that addressed hearing impaired customers of the Telecom multinational in this case, we identified some interesting service concepts; but many of these services lacked a clear business model. This gap fueled the vision of the strategic designer to inspire the design of a new service proposition for the hearing impaired that included a profitable business model. The major design challenge in this case was to design a business model for a network of the Telecom Foundation, telecom business units, government, suppliers, and non-profit organizations to address the needs of hearing-impaired customers.

Modeling of business model: In this case, the strategic designer used free-format sketching, inspired by actors and activity mapping techniques, in a real-time setting in which he met with two actors from two companies in the value network. This free-format sketching method starts with a blank piece of paper, pencil, and markers. The purpose is to draw the model by hand, based on 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 hearing-impaired person. So visually each actor is given a

starting point from which to explore his or her position by talking about explicit scenarios of building up a value proposition for the customer. The drawing of the flows of money, products, and information allow the actors to visualize a value proposition, as well as their needs and doubts, in an easy way. The first sketch of what became a complex business model was drawn in about 10 minutes. With this first sketch as input, one-to-one meetings with individual stakeholders were organized to do a reality check and further construct the business model (see Figure 2).

Each stakeholder provided feedback and detailed information about how to organize the process flows in the business model. Thus, more senior managers looked at the flows going in and out from the headquarters, while shop owners looked in particular at 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. The actors were invited to directly participate in the modeling. After every two or three meetings, the strategic designer sketched a new version of the business model. Eventually, the business model for serving hearing impaired people was sketched in four iterations: from a complex model in which existing logistics needed major modification and collaboration with the new business partner, to a model where existing logistic flows of both companies received a minor addition. This model led to a partnership, and within two months a new service for the hearing impaired was launched and communicated broadly.

Business Modeling for Mental e-Health Services[29]
Social context: This experiment concentrates on mental healthcare institutions that provide treatment services ranging from drug abuse rehabilitation to hospitalization and monitoring of bipolar disorders. These institutions also provide housing for longer term stays. The countries selected in this comparative case experiment were Colombia and The Netherlands.

Design challenge: Telemonitoring is perceived as an opportunity to meet both current and future needs for mental health care service delivery. However, if these new technologies could not be integrated within a system of wider care, services, resources, and processes, their chances of success would decrease. The main design challenge in this experiment was to use modeling to identify business opportunities for customer-centered e-health and, in particular, to explore and design exchange relations in a network of health care organizations and actors.

29 Laura Niño Cáceres and Catalina Ruiz Arias, "Mapping Customer-focused Business Models for eHealth: a Caring Network" (Paper [unpublished] for the Strategic Product Design Research Project Master course, Delft University of Technology–Faculty of Industrial Design Engineering, 2012).
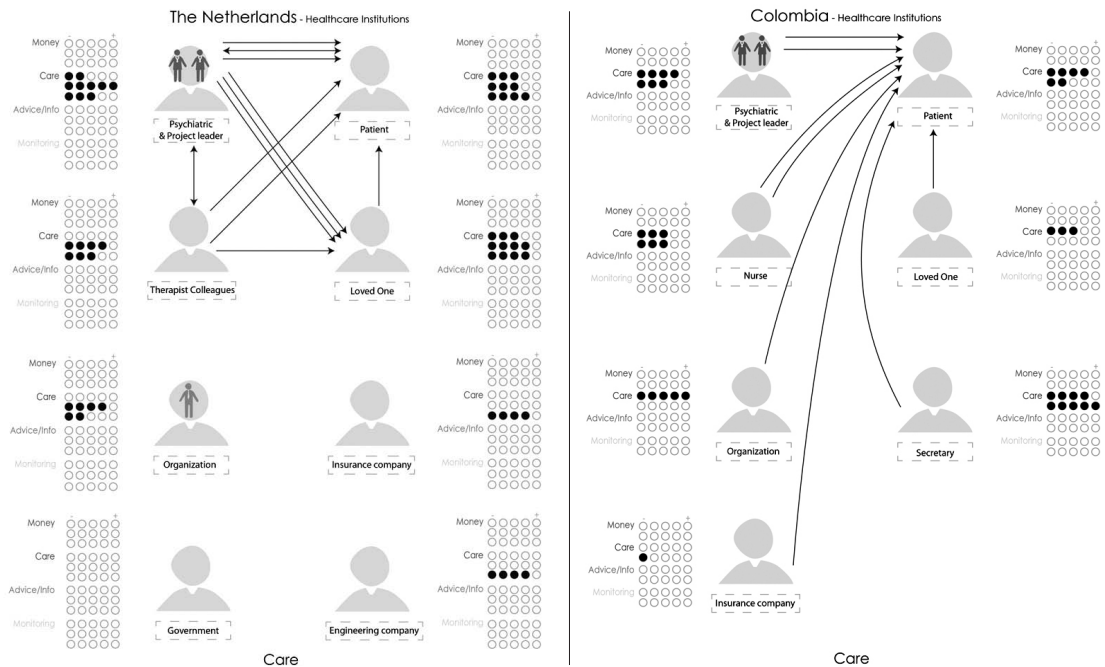
The Netherlands - Healthcare Institutions

Colombia - Healthcare Institutions

Figure 3 (left and right)

Net transaction model (Niño Cáceres and Ruiz Arías, 2012).

Modeling of business model: A new designerly tool was devised by combining the Human-Centered Design toolkit and the Net-Map tool into two mapping templates that could also be used on an iPad: one for patients and informal care givers (e.g., a husband, daughter, ant) and one for a formal care giver (e.g., a specialist, therapist, nurse).

The strategic designers adopted several steps to guide the use of the mapping templates. They started the net transaction mapping by providing the interviewees with the templates, an additional instruction sheet, and four color markers. Then interviewees were invited to: (1) identify and name the main actors; (2) create and draw link relations with arrows of different colors; and (3) note the degree of satisfaction or investment with the service being received by "coloring the dots in the mapping template (see Figure 3)" From the individual datasheets, the designers developed an aggregated visualization.

The transaction mapping was visualized separately, and the relations between actors and the level of satisfaction or investment were grouped by type of relation among the different relational categories. The number of arrows shown between actors indicates a stronger relation. The arrowhead points to the receiver in the relation, which can actually point in both directions, and dotted lines show where a weak or missing relation is perceived by the respondents. The advice and information exchange and the level of satisfaction or investment was measured and translated into percentages to support the visual analysis, which is synthesized in Figure 3.[30]

30 Evelien Griffioen, "Business Model Design for the Healthcare Sector: Sustainable Business Model Design for the Heart Failure Home Telemonitoring Opportunities in Western Europe" (Masters' thesis Strategic Product Design, Delft University of Technology, Faculty of Industrial Design Engineering, 2012).

*Business Modeling for e-Health Services for Heart Failure Patients*
Social context: Heart failure is one of the major diseases in Western Europe, with a prevalence of 1–2%. From the exploratory research, we learned that 47–70% of all healthcare costs for heart failure result from hospitalization, including readmissions. An innovative product service system of telemonitoring the health conditions of a heart failure patient is focused on keeping patients out of the hospital and avoiding readmission. In doing so, this could cut back on the largest cost for heart disease management.

Design challenge: The design challenge in this case study has three elements. First, the strategic designer is to investigate the "service design" of heart failure management. Heart disease management requires a complex context involving several actors, including the hearth failure patient, the general practitioner (GP), GP assistants, specialists (cardiologists), and specialized nurses in hearth failure management. Also involved are hospitals, municipalities, and relatives. The second design challenge is to gather insights into the daily practice of heart failure disease management. The third and largest aspect of the design challenge is the modeling of business models.

Modeling of business model: The value transaction mapping tool that we designed in this experiment is inspired by the IDEO Human Centered Design Toolkit; we adapted the activity mapping tools for creating a context map and personal journey to account for 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, we designed a set of actors' cards and a concentric context map placing the heart failure patient in the middle. Actors are represented with an info graphic of either a person or a building (representing an organization as actor). In this case, the actors' cards represent the actors in heart disease management, including the patient, relatives, GPs, GP assistants, specialists, and nurses dedicated to hearth failure management. Furthermore, the organization actors' cards represent insurers, the government, municipalities, and employees. The set also includes blank cards for additional actors that emerge or become visible in the conversations.

This modeling starts with a large blank piece of paper, color 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 connections consisting of care provision, emotional support, financial flow, and other influences or relations in which information and advice are provided. Different actors were invited to create visual maps and diagrams, including
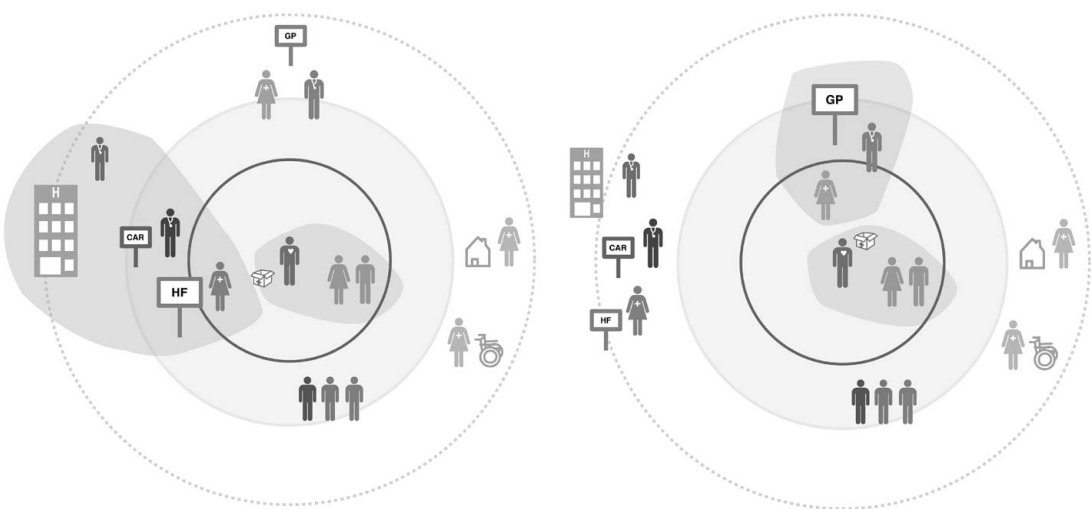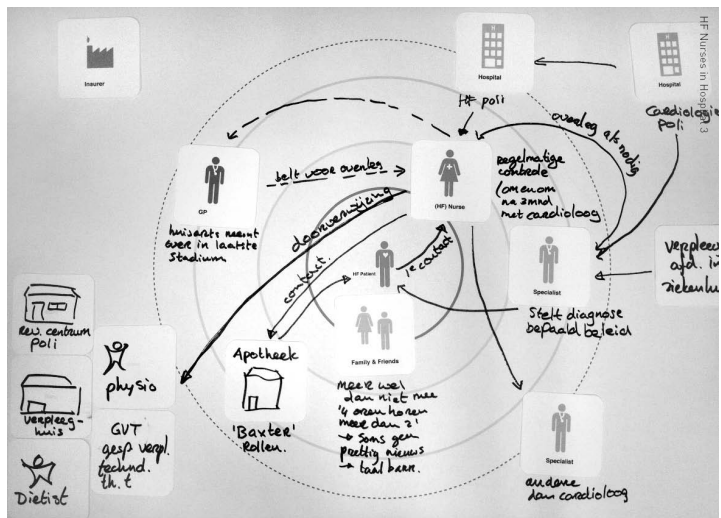
patients, relatives, GPs, specialists, and heart failure nurses. Drawn
from the raw data maps, eHealth service scenarios were then
mapped (see Figure 4).

Discussion of Modeling Experiments

By experimenting with and adapting modeling methods and tools,
we actually constructed business models. To do so, we created
three types of mapping methods: free format sketching, net trans-
action tool and value transaction mapping (see Table 2).

We found that each method has its own characteristics and
use and that for any given situation, one modeling method is more
suitable then another. Through the experimentation with these
designerly tools, we were able to reframe the challenge of designing
business models one step further: *Modeling of actors, perspectives, and*

Table 2 | Overview of modeling approaches for business model design

Modeling Method	Visual thinking method	Symbol design	Transactions modeling	Co-modeling	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 center," "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 and Ruiz, 2012)**
Value transaction map	Demarcation of business model domain, context modeling 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-modeling a value network efficient in time	**Health and Wellbeing company** **(Griffioen, 2012)**

value transactions in a network structure of activity transactions in such a way that the value proposition and profit formula are appropriate and acceptable.

As demonstrated in our approach, business model design is not concerned with the detailed level of business process redesign that sketches workflows and organization structures. Instead, it focuses on the level of network exchanges by relational contracts. Casadesus-Masanell and Ricart (2009) stress that simplifying the representation of the business models into main categories is important in being able to work with the model from a high level perspective; avoiding excessive detailing allows a business model to remain flexible. In this respect, the design process of transactions in business models is more closely related to value chains and value networks.

For future research and practice, we propose continued experimentation in modeling to provide a broader base for the evaluation of visual prescription and the usefulness of outcomes

in implementing business models for e-Health. Directions for improvement for the mapping methods include: (1) increasing the transparency of the transaction modeling and (2) looking at aggregation possibilities between contexts, organizations of networks, firms, and teams.

In sum, as designers engage in new social contexts of e-Health services and identify complex problems for business modeling, we reframe the problem and invent new design-oriented tools to cope with the new situation of Internet technology innovation. To address the designing challenge of business models, we recognize that, first, creating a business model means *modeling value transactions and a network structure of process transactions.* Second, in combination with designerly methods and tools, generating business models means *modeling actors, perspectives, and value transactions in a network structure of activity transactions.* Finally, with the mobilization of social network knowledge, we argue that modeling a business model is actually co-modeling a business model. With these starting points for a modeling approach, we expect future research to further advance business modeling using experiments in e-Health and other social contexts that engage modeling actors, perspectives, and value transactions in a network structure of activity transactions.