Association for Information Systems
AIS Electronic Library (AISeL)

ICIS 2004 Proceedings

International Conference on Information Systems (ICIS)

December 2004

Customer and Network Value of Mobile Services: Balancing Requirements and Strategic Interests

Timber Haaker
Telematica Instituut, The Netherlands

Harry Bouwman
Delft University of Technology, The Netherlands

Edward Faber
Telmatica Instituut, The Netherlands

Follow this and additional works at: http://aisel.aisnet.org/icis2004

CUSTOMER AND NETWORK VALUE OF MOBILE SERVICES: BALANCING REQUIREMENTS AND STRATEGIC INTERESTS

Timber Haaker
Telematica Instituut
Enschede, The Netherlands
timber.haaker@telin.nl

Harry Bouwman
Delft University of Technology
Delft, The Netherlands
w.a.g.a.bouwman@tbm.tudelft.nl

Edward Faber
Telematica Instituut
Enschede, The Netherlands
edward.faber@telin.nl

Abstract

Designing business models for mobile services is a complex undertaking. A business model can be seen as a blueprint of four interrelated components: service offering, technical architecture, and organizational and financial arrangements. Little attention has been paid to how these different components are related to one another. Multiple actors have to balance different design requirements, strategic interests, and business logics to create a win–win situation, in which each actor has incentives to cooperate. Knowledge on the interrelation between and within the four components is needed to enhance our understanding of what constitutes a viable business model. In this paper, the connections between these components are explored by analyzing the critical design issues in business models for mobile services (e.g., targeting, branding, and customer retention in the service domain; security, quality of service and system integration in the technology domain; network governance in the organization domain; and revenue sharing in the finance domain). A causal framework is developed linking these critical design issues to expected customer value and expected network value, and hence to business model viability.

Keywords: Business models, mobile, mobile technology, organizational networks

Introduction

The mobile telecom industry is currently facing opportunities that may radically change the field of mobile telecommunication. The development of new types of networks will spark the development of mobile Internet services. By *mobile services*, we mean all kinds of innovative services that combine technologies and concepts from the domains of telecommunications information technology, and consumer electronics.

Most industry players currently lack the resources and capabilities to exploit these opportunities. Mobile services are increasingly developed and provided by networks of cooperating organizations. It is assumed that flexible value webs or value networks will arise and replace traditional, static, and linear value chains (Miller and Lessard 2000). In such a value network, each player controls different capabilities and the resources. Innovation thrives on the combination of these capabilities and resources of multiple actors.

Cooperation in value networks is by no means a straightforward task. Various studies (Bleeke and Ernst 1993; Levine and Byrne 1986) indicate that companies encounter serious difficulties in achieving the anticipated benefits from cooperation. Given the disappointing success rates of interfirm cooperation and the risks and costs involved in the introduction of new mobile services,

it is not surprising that practitioners and academics pay a great deal of attention to the concept of business models. In our view, a business model is a blueprint that describes how a network of organizations cooperates in creating and capturing value from new, innovative services or products (Chesbrough and Rosenbloom 2002). Designing business models is a complex task. Technical, financial, organizational, and professional user or consumer needs and requirements have to be balanced. For instance, what makes sense from a technical point of view (better specifications of positioning technology) may not make sense from a financial (higher costs) or user (privacy concerns) perspective. Moreover, organizations have to balance different interests and business logic to create a win–win situation, in which each player has an incentive to cooperate.

Although literature on strategic alliances in the telecommunication domain (Carlson 1996) and network formation (Gulati et al. 2000; Kothandaraman and Wilson 2001; Li and Whalley 2002) is available, it fails to provide insight into the subtleties involved in the design of viable business models for the provisioning of mobile services in value networks. The predominant focus of literature on business models has thus far been on defining and classifying business models. Little attention has been paid to how the viability of business models is related to critical design issues. We define a critical design issue as a decision regarding the characteristics or provisioning of a (mobile) service that has significant impact on the viability and feasibility of that service.

We will present research into the critical design issues of business models for new mobile services that are delivered by complex value networks. The objective is to better understand what constitutes a viable business model. The critical design issues are found in (and between) each of the four domains that constitute the business model: the service, technological, organizational, and financial domains. Before we present our research, we will first discuss the theoretical framework of this research.

Business Models

The field of business models has developed over the past few years from defining business models (Afuah and Tucci 2001; Bouwman and Van der Ham 2003a; Hedman and Kalling 2003; Mahadevan 2000; Osterwalder and Pigneur 2002; Timmers 1998; Weill and Vitale 2001) via exploring business model components and classifying business models into categories, to developing descriptive models of business models (for an overview, see Pateli and Giaglis 2003). The majority of researchers focus on the actors, relationships, and value objects exchanged (Weill and Vitale 2001; Tapscott, et al. 2000). Little attention has been paid to conceptualizing the linkages between variables of the different business model domains or on *cross-company* collaboration in complex value networks. We focus on business models for service offerings that require cross-company or multi-actor collaboration. We look beyond the individual firm and consider the business model of a networked enterprise: a collaborative effort by multiple companies to offer a joint proposition to their consumers. When comparing the different definitions of business models, it is possible to distinguish some common components (Faber et al. 2003a) (see Figure 1).

- **Service domain**: a description of the value proposition (added value of a service offering) and the market segment at which the offering is targeted

- **Technology domain**: a description of the technical functionality required to realize the service offering

- **Organization domain**: a description of the structure of the multi-actor value network required to create and distribute the service offering, and to describe the focal firm's position within this value network

- **Finance domain**: a description of the way a value network intends to generate revenues from a particular service offering and of the way risks, investments, and revenues are divided across the different actors in a value network

The challenging aspect of analyzing and designing business models is that it requires managers, service designers, and business developers to connect and balance design choices in different domains, in the face of technical, market, and legal developments, the ultimate aim being to create sufficient value for the customer and the network of collaborating actors.

The central concept in the ***service domain*** is value. Value is seen as the perceived benefits and total costs (or sacrifice) of (obtaining) a product or service for *customers* in target markets (Chen and Dubinsky 2003; Petrovic and Kittl 2003). The service offering must be considered better and deliver the desired satisfaction more effectively and efficiently than competitors. Customer or user experience is key (Aron and Sampler 2003; Bouwman et al. 2001). To a large extent, the added value of third-generation mobile services is stated in terms of anyplace, anytime, anywhere. However, this is a very general description of customer value. Future mobile and wireless technologies enable applications and services that are situation and context aware, augmented and virtual, and use speech recognition, multimodal interaction, and human, supervised computing. Customer value that is envisaged
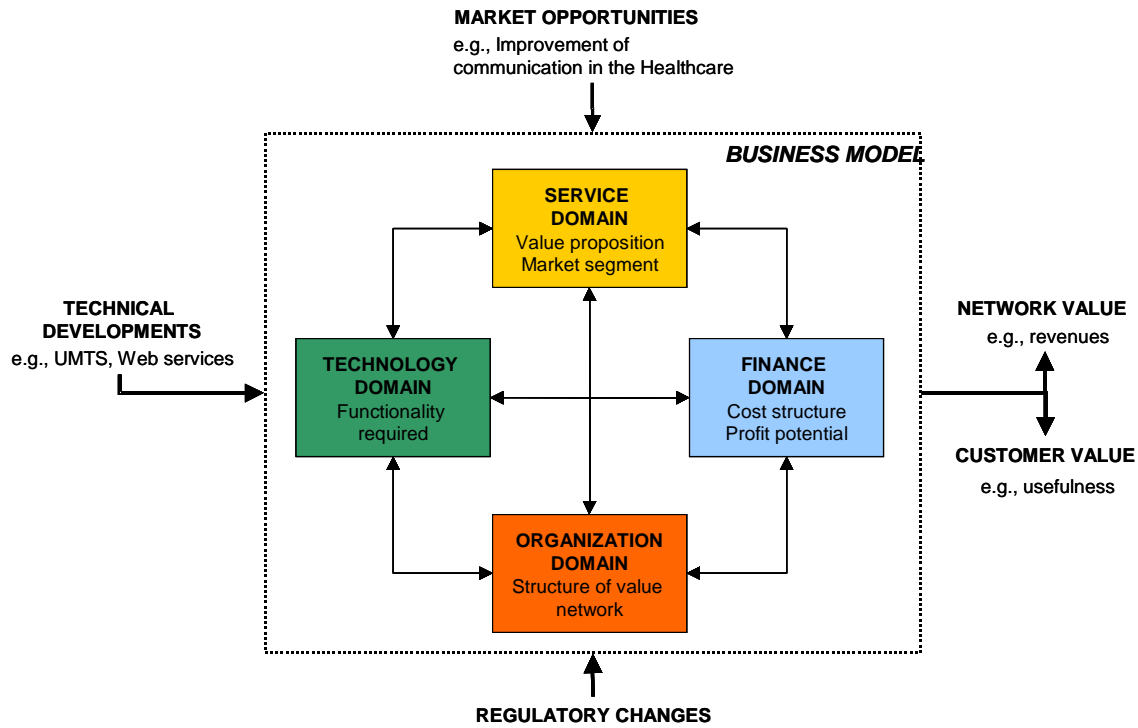
MARKET OPPORTUNITIES
e.g., Improvement of
communication in the Healthcare

BUSINESS MODEL

SERVICE
DOMAIN
Value proposition
Market segment

TECHNICAL
DEVELOPMENTS
e.g., UMTS, Web services

TECHNOLOGY
DOMAIN
Functionality
required

FINANCE
DOMAIN
Cost structure
Profit potential

NETWORK VALUE
e.g., revenues

CUSTOMER VALUE
e.g., usefulness

ORGANIZATION
DOMAIN
Structure of value
network

REGULATORY CHANGES

Figure 1. Descriptive Business Model Framework

in initial business models has in many cases little to do with customer value as perceived by the end-user. This value strongly depends on the user's personal or consumption context (Chen and Dubinsky 2003). Therefore, we introduce the related concepts of *intended* and *delivered value* on the side of the provider, and *perceived value* on the side of consumers. These concepts model the match or gaps between the different perspectives on value.

A central concept in the ***technology domain*** is functionality. *Functionality* can be defined as the things a system or application can do for its end users. Examples of functionality enabled by 2.5 and 3G mobile services are improved quality, always-on capabilities, and higher data rates, which are assumed to carry video and sound clips. Future outlooks are directed toward the personal area and wearable networks, the so-called I-centric services, which automatically adapt to individual requirements (Popescu-Zeletin et al. 2003). Another core concept of the technology domain is *technical architecture*. A technical architecture describes the fundamental organization of a technical system, which is needed by firms in the value network to deliver the intended customer value of the service as discussed in the service domain. Important components of a technical architecture are applications, devices, access networks, service platforms, and backbone infrastructure. Important design decisions with regard to the technical architecture discuss issues as centralized vs. distributed, open vs. closed, and interoperable vs. non-interoperable.

Central concepts in the ***organizational domain*** revolve around the *resources and capabilities* that have to be available within the organization or in the organizational environment. Although the resource-based approach (Barney 1991; Porter 1985) assumes that resources and capabilities should be organized internally, we observe that organizations do not control all the resources, specifically in the domain of mobile and wireless services. In their analysis of business models, Hedman and Kalling (2003) conclude that the bottom line is that economic value is determined by a firm's ability to trade and absorb information and communication technology resources, to align (and embed) them with other resources, to diffuse them in activities, and to manage the activities in a way that creates a proposition at uniquely low costs or with unique qualities in relation to the industry in which the company is operating. Collaboration, in-sourcing, and network formation are possible strategies to obtain the necessary resources (Pfeffer and Salancik 1978). Therefore, organizations increasingly work together to deliver customer value in value networks (Hedman and Kalling 2003; Mahadevan 2000; Miller and Lessard 2000). Depending upon the competitive environment, industry sector, and operating risks involved, specific actors contribute key assets, in the case of mobile services most of the technological and marketing resources, in the creation of value and a different configuration of actors is likely to result, some actors taking structural, integrative roles in the alliance and others taking supporting, facilitating roles (Hawkins 2003).
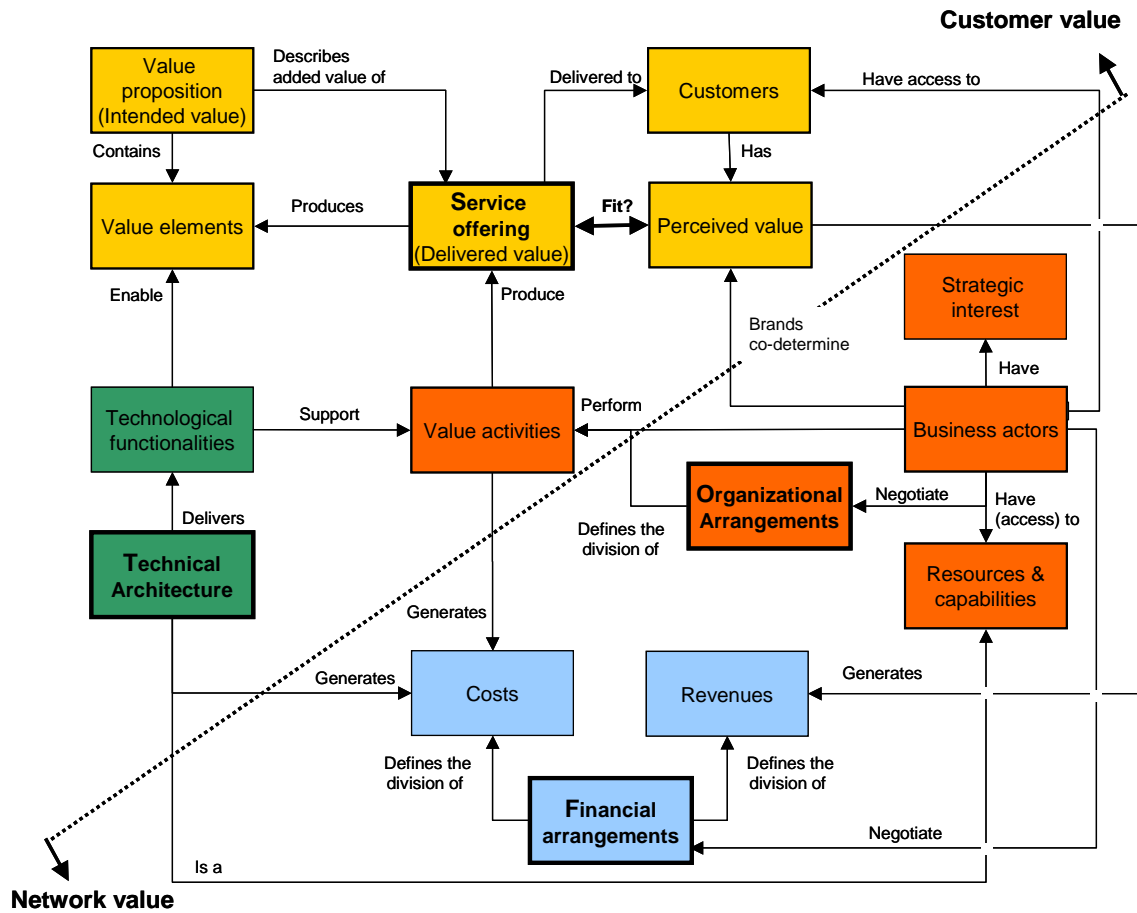
Figure 2. Elaborated Descriptive Business Model Framework

An important issue in collaboration is network governance. It is possible to distinguish three phases in value network governance (Kaplinksy and Morris 2001). First, the basic rules for participating in the value network have to be set. Second, it is necessary to audit performance and check compliance with the set rules. Third, value network participants may be supported in meeting the rules. However, the most basic question is who is the *governor* or the *center of gravity* in the network and how is the legitimacy of exerting governance established.

The core concepts in the ***financial domain***, the *financial arrangements*, revolve around investment decisions, *revenue* models, and revenue sharing arrangements. Financial methods are aimed at average *cost*-effectiveness, net cash worth, and internal return (Demkes 1999; Renkema 1996). Some methods go beyond the merely financial considerations, for example, real option theory, a more detailed elaboration on the net cash worth concept that explicitly puts a value on managerial flexibility to respond to future developments (Demkes 1999; Renkema 1996). Generally speaking, the cost side is reasonably well charted. As far as the revenue side is concerned, which from our point of view includes realizing cost reductions but also long-term advantages that stem from intangibles, the literature is less uniform (Low and Cohen Kalafut 2002). An important question is how investments are arranged within complex value networks. Investment decisions weigh the interests of the actors involved and take the mutual benefits of multiple organizations into account. Organizations that are connected through intended relationships and interdependencies consider risk sharing, solving common problems, and acquiring access to complementary knowledge to be major motivators for collective investments. Interorganizational investments require explicit articulation and collective agreement on the terms of investment and timing (Miller and Lessard 2000). The share of each participant and the corresponding partnership ratio must be defined. The success of these arrangements hinges on whether or not the role of each member within the terms of the institutional framework is clearly defined (Miller and Lessard 2000). There is apparently a clear relation between organizational and financial arrangements.

Designing Business Models

Creating customer value is not an easy task due to the difficulty of extracting user requirements and conflicting design requirements. Design choices in the service domain may affect those of the technology domain and vice versa. Moreover, creating value for business actors (network value) is complex due to the conflicting *strategic interests* of partner organizations. *Actors* often originate from different industries (e.g., network operators, financial institutions, and retailers), each with their own strategic interests (e.g., generate traffic, extend services to customers, generate transactions). Design choices in the organization and finance domain may serve the strategic interests of the involved actors. For instance, operators and content providers may disagree on how to brand an information service and who needs to pay whom. Next to interdependencies between the service and technology domain, and the organization and financial domain, there are also interdependencies between the technical domain and the financial domain: not every solution is affordable, etc. Knowledge on how to effectively balance requirements and strategic interests within and between the different domains is largely missing in the business model literature (Hedman and Kalling 2003; Seddon and Lewis 2003). To develop insight into how organizations can design balanced business models, researchers need to go beyond identifying simple success prescriptions and try to understand the critical design issues in business models and their interdependencies. In this paper our focus is primarily on the critical design issues that are directed to the four domains in the business model in relation with customer and network value.

Research Methodology

Our research approach contains three steps. First, we have build a conceptual framework describing the most important design variables within the service, organization, finance, and technology domains and the relationships between these variables (see Faber et al. 2003a). We use the term *design variable* to denote that our framework focuses on variables that can be influenced by design teams, business developers, and managers. Second, a considerable number of cases (i.e., business models of mobile services; see Table 1) have been analyzed. Case selection criteria were innovativeness of mobile services (2.5G, payment services), relevance of specific aspects for instance domain (health care, mobile entertainment), or context (community services). For the case study, case and interview protocols (Bouwman and Faber 2003) were developed and used. Interviews were recorded and transcribed. Data from interviews were supplemented with information from company Websites, industry reports, and academic literature. Data were systematically coded and analyzed. Interviewees validated results.

The cases had as objective to detect *critical design issues.* A critical design issue is defined as a design variable that is not nominal in nature (i.e., availability of a network or of investments), but is perceived to contribute to the viability of the studied business model. When practitioners explicitly mentioned an issue as nominal or critical, the researchers coded this accordingly. Based on the case study descriptions (see Table 1 for references on individual cases) for every domain—service, organizational, technical, and financial, as described in the conceptual framework—specific critical design issues were extracted and systematically clustered. Based on the recurrence of issues and/or the perceived relevance for the viability of the business model, as indicated by the interviewees and coded as such, these issues were qualified as critical (for an overview of extracted critical design issues, see Haaker et al. 2004a). Third, this knowledge on critical design issues has subsequently been used to build causal frameworks describing the interrelatedness of design issues and their relationship with business model viability.

Table 1. Overview of Cases

Theme	Cases	Extensive Publications on Case Analysis
Mobile entertainment services	My Babes, Radio 538 ring tunes	Maitland et al. 2003
Mobile tracking and tracing service	TMC4U (Traffic Management Channel for You), Traphic SMS alerts (Vialis), Finder i-mode service (KPN Mobile)	Faber et al. 2003b Van de Kar et al. 2003)
(Mobile) Community services	I-Karos, Vaccination Database, Botfighter	Rietkerk and Timmerman 2003
(Mobile) Presence and Instant messaging services	Splendo, Jaytown, MSN	Kijl and Timmerman 2003
Business to employee services	P-info, Lucio, Zorgpas, Caremore	Bouwman and Van der Ham 2003b
Mobile payment services	Moxmo, Mobile2Pay, Mobipay	Faber and Bouwman 2003

Critical Design Issues in the Service Domain

Critical design issues that originate from the service domain are targeting, creating value elements, branding, and customer retention.

Targeting. An important issue in almost every case was choosing a profitable target group. Should the *service offering* be targeted toward consumers or business? Should the service offering be targeted toward a niche market or a mass market? Should the service focus on youngsters or elderly people? Sometimes service providers formulated a growth strategy in which the target group evolved from one market segment to another. For instance, Moxmo's strategy is to extend its activities and related target group from micro payments (e.g., ticketing and ring tones) to medium-sized payments (e.g., payment of compact discs).

Creating value elements. Closely connected to choosing a target group is formulating a compelling *value proposition* for end users. The added value of a service can be based on *value elements* such as fun, efficiency, accuracy, speed, personalization, trust, etc. The cases show a clear tension between the possibilities offered by technology and the wishes and needs of end users. Quite a view of the studied services did not have a clear and compelling value proposition and seemed to be blinded by the technical possibilities. For instance, Lucio's, which is a provider of business-to-business access to back-office services, value proposition mainly boils down to providing access to Microsoft Outlook and the Internet at any time when away from the office. This value proposition is heavily based on the technical capabilities of the service offering. In several cases, an important value element was trust. The main issue was how to enhance trust (or reduce the need for trust). The objects of trust differed in the cases studied. In some cases, trust was related to the reliability (branding) of *business actors* (e.g., mobile payment cases), whereas in other cases, trust was associated with the security and privacy of the deployed technology (e.g., product information management cases). Also, different mechanisms were used to enhance trust. For instance, in the mobile payment cases we found that Mobipay used a trusted third party (institution-based trust) whereas Moxmo mainly relied on recurrent positive experiences (process-based trust).

Branding. Another important design issue in the cases studied was how to reach customers. An important mechanism to reach customers was branding. Brands seem to directly influence the *perceived value* of service offerings, which makes it an important means to create customer value. Brands were used for different purposes in the cases studied. First and foremost, brands were used to increase visibility of the service in the market (all cases). Second, brands were used to communicate trustworthiness (e.g., mobile payment and community cases). An important design choice in the mobile information cases was whether to brand a service as an operator or content provider service. An important decision parameter was the recognition of the brand by the target group.

Customer retention. Besides choosing a target group and defining the added value, customer retention was found to be a critical design issue. Customer retention refers to marketing strategies aimed at keeping customers satisfied and loyal with the product or service. The cases show that service providers adopt different strategies to stimulate recurrent usage of their services. In the entertainment cases, service bundling and personalization were used to promote customer retention. In the tracking and tracing cases, the accuracy and actuality of information was used to attract and retain users. In the PIM cases, the strategy was to introduce new versions with new *functionality*. In the access to the back-office cases, customization of the service for end-user organization was used to create a lock-in effect.

The extracted critical design issues and related design requirements are summarized in Table 2.

Table 2. Critical Design Issues and Related Design Requirements (Service Domain)

Critical Design Issue	Description	Balance of Requirements
Targeting	How to define the target group?	Generic vs. niche service B2C vs. B2B service
Creating value	How to create value for the targeted users of the service?	Technological possibilities vs. user needs and wishes
Branding	How to promote/brand the service?	Operator vs. content brand
Customer retention	How to stimulate recurrent usage of service?	Customer lock-in vs. customer annoyance

Critical Design Issues in the Technology Domain

Critical design issues that originate from the technology domain are security, quality of service, system integration, accessibility for customers, and management of user profiles.

Security. Trust of end-users and customers in a *service offering* is partly determined by the way security is implemented in the *technical architecture*. That is, the way in which access to a service is granted and how security of communication and (stored) information is realized. Often, security requires a trade-off between ease of use or privacy considerations and preventing abuse. For example, in community and instant messaging cases, access ranges from anonymous access, use of a username (nickname) and password (as in MSN Messenger), to full user identification (as in an enterprise PIM service). With anonymous access, privacy is guaranteed but a user cannot be traced in case of abuse of the service. In the case of mobile entertainment services, authentication of users is simply based on the SIM card in their mobile phone. Security may be realized more easily in a closed environment. For example, for enterprise PIM services, the company may deploy its own IM server shielded from the outside world by a firewall. Obviously the service cannot include contacts from outside the company, thereby limiting its use and value.

Quality of service. In all cases studied, the performance of the *technical architecture* in delivering the *technical functionalities* has a profound impact on the *service offering* and *perceived value*. A balance between the quality of the service and the incurred costs has to be maintained. A typical performance measure influencing the quality of service is the accuracy of the deployed positioning technology in tracking and tracing services.

For mobile entertainment services, the data transmission rate determines download times and, therefore, also acceptable page sizes (3 to 5 kb per page for I-mode services).

Management of user profiles. For personalization of a *service*, a user profile that contains user interests, preferences, and behavior must be created and maintained. The management of this profile (.e., creation, use, maintenance,and access to the profile) requires *technical functionality* that may be realized in different ways. Balancing is needed between user involvement and automatic profile generation, and between privacy and access to the users profile. For MSN Messenger,the IM server keeps a profile for each user. A privacy statement is issued to users about the protection of the data provided. In the case of the Traphic SMS-alert service, the user controls his profile, containing times and routes of travel, via the Internet. In the I-mode finder case, the necessary location information is automatically determined by the operator and anonymously transferred to the location-based service provider.

System integration. To what extent the new service can be integrated with the existing *technical infrastructure* partly determines the adoption of the *service*. The trade-off with system integration is between flexibility and costs. The costs for building on legacy systems may be lower but provide for less flexibility than an open system based on standards and open interfaces. For instance, for mobile payment services, the degree of integration with existing payment solutions is an important barrier for merchant adoption. In the Botfighter case, the geographic information system was not integrated in the general platform but included in the specific Botfighter application, as no generally accepted standard for the GIS was available.

Accessibility for customers. The accessibility of the service for the target group is influenced by the choice of an open or a closed architecture. A closed architecture restricts service usage to a restricted target group. This may be intentional, for instance in enterprise IM services, access-to-the-back-office services, or mobile entertainment services offered to the operator's customer base. But it may also be unintentional, as when a service requires specific resources (a handset) or capabilities (a cumbersome user interface) from the end-user. For instance, adoption of the P-Info service (a service for police officers) was hindered as users required mobile devices that could be used both on the street as in patrol cars; officers had a strong preference for voice interfaces and access to critical databases was not realized.

The extracted critical design issues and related design requirements are summarized in Table 3.

Critical Design Issues in the Organization Domain

Critical design issues that originate from the organization domain are partner selection, network openness, network governance, and network complexity.

Table 3. Critical Design Issues and Balancing Requirements (Technology Domain)

Critical Design Issue	Description	Balance of Requirements
Security	How to arrange secure access and communication?	Ease of use vs. abuse and privacy.
Quality of Service	How to provide for the desired level of quality?	Quality vs. costs
System Integration	How to integrate new services with existing systems?	Flexibility vs. costs
Accessibility	How to realize technical accessibility to the service for the target group?	Open vs. closed system
Management of user profiles	How to manage and maintain user profiles?	User involvement vs. automatic generation

Partner selection. An important design issue in all cases is acquiring access to *resources and capabilities* needed to realize a *service offering*. A distinction can be made in *business actors* that provide indispensable and irreplaceable (critical) resources and capabilities, and those who provide supporting resources and capabilities. For instance, in the traffic information cases (Traphic SMS alerts and TMC4U), an important issue was whether or not to include the government in the value network. Given the cost of acquiring and processing raw traffic data, government funding is seen as a critical resource for any commercial traffic service. In the mobile payment cases (Moxmo, Mobipay, and Mobile2pay), an important issue was whether or not to include a financial institution as a transaction enabler and trusted third party in the value network. Whereas Moxmo decided to operate independently from the financial institutions to reduce transaction costs, Mobipay and Mobile2pay decided to include one or more financial institutions in the value network to enhance trust. Access to critical resources and capabilities (e.g., customers, content, funds, etc.) was found to be an important *strategic interest* when selecting partners.

Network openness. The extent of openness indicates the degree to which new *business actors* can join the value network and are allowed to provide services to customers. In the cases we studied, we observed two different *organizational arrangements*: the closed model, in which a relatively fixed consortium of partners collaborate, and the walled-garden model, in which new partners are able to join the value network if they comply to certain rules. For instance, in the entertainment cases (My Babes and Radio 538 ring tunes), the I-mode Finder case, and community cases (Ikaros, Vaccination database, and Botfighter), portal providers used a walled-garden model to control the quality of the provided content, whereas in the instant messaging cases we found instances of a closed model (Splendo News messenger and Jaytown Post-@). Surprisingly no instances were found of an open model in which partners are free to join the value network and offer services and content (e.g., KazaA). When choosing between various degrees of network openness the desired control, exclusiveness, and customer reach of the service were found to be of main strategic concern. The higher the desired control and exclusiveness the more likely partners are to adopt a closed model. High customer reach may be an argument for choosing an open model.

Network governance is, in all cases, a dominant actor, often the one with access to the *customers and end users* or the one that developed the *service offering* and was managing the value network. These *business actors* often approached and selected collaboration partners, set the rules for collaboration (*organizational arrangements*), and monitored the compliance with these rules. For instance, in the entertainment cases (My Babes and Radio 538 ring tunes), community cases (Ikaros, Vaccination database, and Botfighter), and the PIM cases that focused on B2C applications (ICQ for I-mode, Splendo MiMessenger), the portal provider is the dominant actor, whereas in the business-to-employee cases (P-info, Lucio, Zorgpas, and Caremore) and some PIM cases (MSN Messenger, Splendo News messenger, and Jaytown Post-@), the application service provider is the dominant actor. Typically, actors with access to customers shield these relations from other actors in the value network, whereas actors lacking these contacts often strive to move up in the value network from, for instance, content provider to service provider. Customer ownership thus seems to be of key strategic concern to actors in the value network.

Network complexity. The cases studied differ with respect to network complexity. Network complexity may arise from the number of relations a focal *business actor* needs to manage in a value network and from the effort needed to couple actors' IT applications and systems (*technical architecture*). The latter is beyond the scope of this paper (technology domain). We found that business actors tend to reduce network complexity by using intermediaries, which act as single points of access. For instance, in the I-mode Finder case, we found that the portal provider (network operator) chose to reduce network complexity by using an intermediary actor to manage the relations with the different content providers. In the Zorgpas case, we found that the high number of organizations (20) that needed to collaborate resulted in an enormous network governance load and efficiency losses. Finally, Mobipay's transaction platform for mobile payment requires the acceptance and collaboration of all major financial institutions in Spain. Hence, Mobipay needs to deal with a considerable degree of network complexity. Moxmo, on the other hand, chose to bypass the financial institutions for its service offering, hence reducing network complexity. There seems to be a trade off between the need to reduce complexity and the need to have access to critical resources and capabilities.

Table 4. Critical Design Issues and Related Strategic Interests (Organization Domain)

Critical Design Issue	Description	Strategic Interests
Partner selection	How are partners selected?	Access to critical resources and capabilities
Network openness	Who is allowed to join the value network?	Desired exclusiveness, control, and customer reach of service
Network governance	How is the value network orchestrated? Who is the dominant actor?	Customer ownership and control over capabilities and resources
Network complexity	How to manage increasing number of relations with actors in a value network?	Controllability of value network and access to resources and capabilities

Critical Design Issues in the Finance Domain

Critical design issues that originate from the finance domain are pricing, division of investments, division of costs and revenues, valuing contributions, and benefits.

Pricing. A customer pays a certain price to obtain or use a service. For adoption and actual usage of the service, the perceived customer value must balance or exceed the price of the service. In the case example for Mobile Payment, the service is free of charge and even entitles the user to reduced prices for purchased goods. The aim is to attract and retain customers. The traffic information service TMC4U offers traffic messages via the RDS channel on car radios. It is free of charge. However, to appreciate this service as a truly personalized service, the driver needs to invest in a car navigation system equipped with a TMC module. VDO Dayton sponsors the service with a small amount for each car navigation system with TMC module it sells. The Traphic SMS alerts user pays a premium SMS price. The service is characterized by relatively high variable costs and virtually no fixed costs for end users. The I-mode services (My Babes, Radio 538 ring tunes, Finder) share identical pricing: they require users to invest in an I-mode phone, operator subscription, I-mode subscription, flat-fee service subscription and fees depending on data traffic. The ceiling for of the fees, including those for the services offered by third parties, are set by the dominant actor, the operator. Pricing seems to be aligned with the aims of the dominant actor in the value network (e.g., maximizing profits or creating market share).

Division of investments. Developing and introducing a new service involves financial risks, as there is uncertainty about the resulting return on the investment. In the B2E service Caremore, some of the uncertainty was resolved by following a phased (investment) approach. Prior to actual rollout of the service, it was tested in pilot groups. Traffic information services like TMC4U and Traphic SMS alerts rely on the government for large investments in infrastructure for acquiring and processing raw traffic data. In the mobile entertainment cases (My Babes, Radio 538 ring tunes) the content providers are responsible for the investments needed to provide content in a format that is acceptable for the operator. Nordic operator Telia introduced a location-based game (Botfighter), which was targeted at the youth segment. Telia regards the investments in the game as a means to win the (long-term) loyalty of the youth. However, to reduce the up-front investment, Telia did not develop the game itself. This was done by It's Alive!, which in return gets a monthly fee plus a share from the SMS revenues. The division of investments seems to match the partners' profitability and risk profiles.

Valuing contributions and benefits. For fair and viable revenue sharing arrangements, it is important to value the contribution of each partner to the service offering and the (intangible) benefits each partner receives. For example, in the Caremore case, the choice for a specific operator was based on an existing trust relation and superior network coverage. In the same case, the valuation of the system integrator changed over time. When the company ordering Caremore acquired the required system integration competencies itself, the original systems integrator was considered too expensive and removed from the value network. For Microsoft, the benefits from its (free) MSN Messenger are mostly intangible: it ties users to the portal and software of Microsoft. Some revenues are obtained from its link with SMS services. However, less than 5 percent of the revenues of Messenger-SMS is distributed to Microsoft. Most of the revenues (90 percent) go to the network operator whose payment relation with the customer provides a strong position in the value network, apparently resulting in this large percentage. In the case of ICQ via I-mode, it is the service provider that receives 86 percent of the fixed monthly subscription fee. Vialis' main interest in offering SMS traffic alerts is in acquiring knowledge about the market for traffic information and getting access to customers in this market. For this benefit, Vialis is even prepared to incur a small financial loss.

Table 5. Critical Design Issues and Related Strategic Interests (Finance Domain)

Critical Design Issue	Description	Strategic Interests
Pricing	How to price the service for end-users and customers?	Realize network profitability Realize market share
Division of investments	How to divide the investments among business partners?	Match individual partners' profitability and risk
Division of costs and revenues	How to divide the cost and revenues among business partners?	Balance between individual partners' profitability with network profitability
Valuing contributions and benefits	How to measure and quantify partners' contributions and (immaterial) benefits?	Fair division of costs and revenues

It seems valuation of contributions is based on actors' access to resources. Actors' intangible benefits depend on strategic interests like acquiring market knowledge or access to customers.

Division of costs and revenues. In the I-mode case, all content partners receive the same share (86 percent) of the fixed monthly subscription fee (2 €) to a service. There is no direct relation between the costs to the content provider and the revenues received. Several cases show a clear connection between incurred costs and revenues. For example, the operator in the Mobile entertainment cases receives revenues based on data transport. In other cases there is a relationship between invested money and share of revenue. For example, in the Botfighter case, game developer It's Alive! and platform provider Ericcson receive a percentage of the SMS revenues. In some cases (SMS Traphic alerts, MSN Messenger), the dominant actor receives fewer revenues than costs but feels sufficiently compensated from intangible benefits. The relation between costs and revenues for each actor seems to depend on the actor's access to critical resources, the risks and level of investments, and the existence of intangible benefits. The extracted critical design issues and related strategic interests are summarized in Table 5.

Explaining Customer Value

Based on the descriptive framework and case findings, we have built a causal framework that explains the expected customer value (see Figure 3). The critical design issues result in clear target group definitions with an acceptable mass, compelling value propositions, an acceptable level of service quality combined with non-obtrusive customer retention mechanism. It is assumed that high scores on these so-called critical success factors will result in a service that meets the expectations of users (i.e., a service that generates customer value). It can be expected that a service that generates customer value will result in a viable business model in the long run.

Most strikingly, critical design issues originating from the technology domain can be considered to be enablers for critical design issues that originate from the service domain. For instance customer reach is enabled by easy access for customers. This is in line with the elaborated descriptive framework in which technological architecture delivers technological functionalities that enable value elements and support value activities.

Explaining Network Value

The expected network value can also be explained based on our research findings (see Figure 4). The critical design issues result in acceptable risks and profitability for network partners, an acceptable division of roles and a sustainable network strategy. Acceptable customer reach and non-obtrusive customer retention are critical for profitability. High scores on these critical success factors will result in a service that creates network value, leading to a viable business model in the long run.

The critical design issues in the organizational domain are instrumental for dividing value activities over multiple actors and aligning their resources, capabilities, and strategic interests. The viability of the business model is bottom-line determined by the ability of the service to deliver customer value that generates sufficient revenues to allow for acceptable network profitability.

The critical success factors presented in both causal models are based on expert assumptions with regard to the key success factors creating customer and network value. Large-scale testing of the validity of these assumptions is the subject of our ongoing research project.
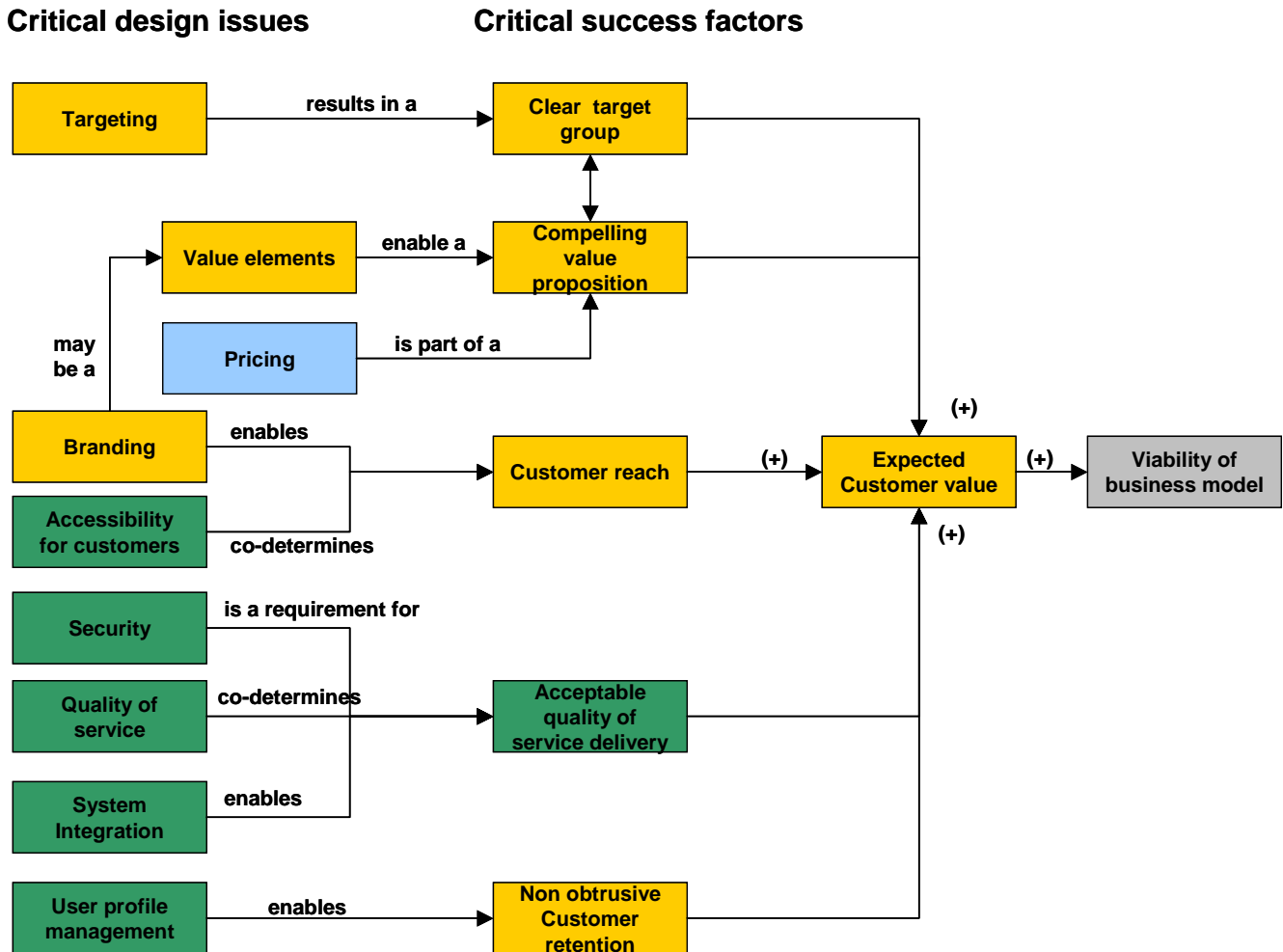
Figure 3. Causal Framework Explaining Customer Value

Conclusion and Discussion

In contrast with existing research with regard to business models, our approach is directed toward the design of viable business models, more specifically, business models for mobile services that are developed by organizations that collaborate in complex value networks. Our research shows that critical interdependencies exist between service definition, technical architectures, and organizational and financial arrangements in the development of mobile (wireless) services. Based on extensive case studies, we found four critical design issues in the service domain (i.e., targeting, creating value, branding, and customer retention) and five critical design issues in the technical domain (i.e., security, quality of service, system integration, accessibility, and management of user profiles). Similarly we found four critical design issues in the organizational domain (i.e., partner selection in order to acquire critical resources and capabilities, network openness, complexity, and governance) and four critical design issues in the financial domain (i.e., pricing, division of investments, division of costs and revenues, and valuing contributions and benefits). Critical design issues from the four domains are directly related to each other. These results have clear practical value. The descriptive and causal framework helps service designers, managers, and business developers to select critical design issues, to analyze the interdependencies, and to balance the design choices to be made. The trade-offs between design choices can be identified and analyzed. Based on the case studies and the causal framework, we developed a methodology for designing viable business models, called the freeband business blueprint method (for more information, see **www.freeband.nl/ projecten/b4u/businessmodellenEN**; Haaker et al. 2004b). This method is used in practice, surprisingly not only in the domain of mobile services, but also more generally (e.g., developing services for an insurance company). The design methodology and its application in workshops will be discussed in a forthcoming paper.
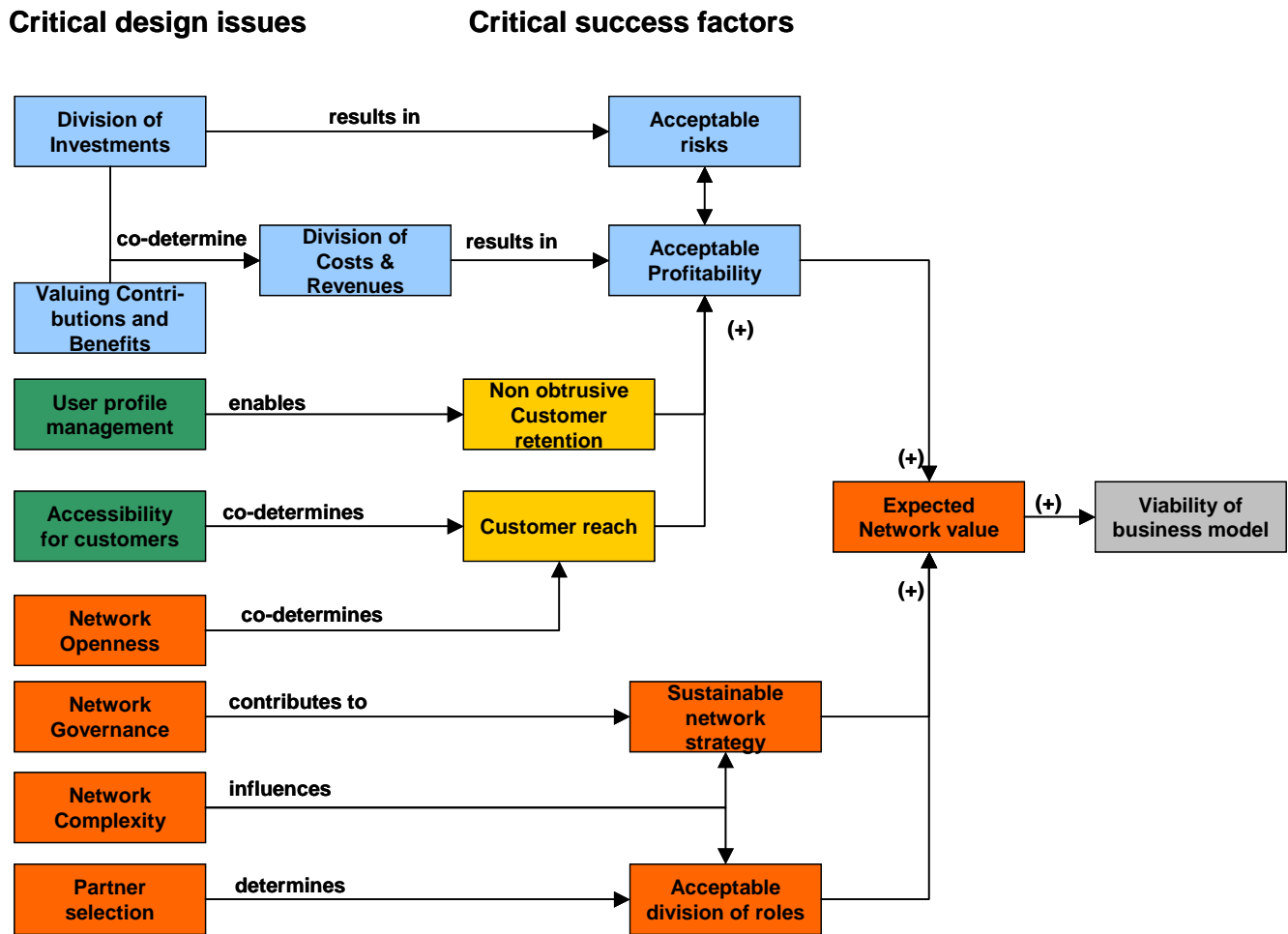
Critical design issues   **Critical success factors**

Figure 4. Causal Framework Explaining Network Value

Although our research has clear spin-offs and practical value, it also has some limitations. First of all, we would like to emphasize that it is impossible for the material presented in this paper to reflect all of the data, the decisions made in the analysis process, the specific results of individual cases, and the steps in the cross-case analysis. The validity of our results depends strongly on the heterogeneity of the cases, which we used as a starting point. Because the selected cases are quite heterogeneous in nature, targeted customers, technology focus, and innovativeness, we may expect that our results are not biased due to case selection.

We also are quite aware that some of our research steps need further validation.

The step from critical design issues to causal framework is, for instance, open for discussion. The critical nature of the identified design issues for (mobile) business models has to be validated in other contexts. For this purpose, we initiated a large-scale survey and organized and will organize design sessions with practitioners. This should result in a more parsimonious causal model. Furthermore, the causal framework as presented needs further testing. This validation can be done by experts and by analysis of a large number of cases. However, a large-scale empirical test will be dependent on the willingness of involved organizations to participate in such a validation effort.

Furthermore, we did not analyze and discuss the business models and business cases of the individual organizations that participated in the complex value system developing a service offering. We intend to take this up in a follow-up research project.

References

Afuah, A., and Tucci, C. *Internet Business Models and Strategies*, McGraw-Hill Irwin, New York, 2001.

Aron, D., and Sampler, J. L. *Understanding IT*, Prentice Hall, Financial Times Prentice Hall, Harlow, 2003.

Barney, J. R. "Firm Resources and Structural Competitive Advantage," *Journal of Management* (17), 1991, pp. 99-120.

Bleeke, J., and Ernst, D. (Eds). *Collaborating to Compete: Using Strategic Alliances and Acquisitions in the Global Market Place*, John Wiley, New York 1993.

Bouwman, H., and Faber, E. "B4U Case Study Protocol," Working Paper, Telematica Instituut, Enschede, The Netherlands, 2003.

Bouwman, H., Staal, M., and Steinfield, C. "Klantenervaring en Internet concepten. (Consumer Experience and Internet concepts)," *Management and Informatie* (9:6), 2001, pp. 52-60.

Bouwman, H., and van den Ham, E. "Business Models and eMetrics: A State of the Art," in *Elife after the Dot.com bust*, B. Preissl, H. Bouwman and C. Steinfield (Eds), Springer Verlag, Berlin, 2003a.

Bouwman, H., and van den Ham, E. "Exploring Value Networks Enabling the Delivery of Back Office Content to Mobile Workers," paper presented at the ITI'03 Europrix Conference, Tampere, Finland, November, 13-14, 2003b.

Carlson, R. *The Information Super Highway: Strategic Alliances in Telecommunications and Multimedia*, St Martin Press, New York, 1996.

Chen, Z., and Dubinsky, A. "A Conceptual Model of Perceived Customer Value in E-Commerce: A Preliminary Investigation," *Psychology and Marketing* (20:4), 2003, pp. 323-347.

Chesbrough, H., and Rosenbloom, R. S. "The Role of the Business Model in Capturing Value from Innovation: Evidence from Xerox Corporation's Technology Spinoff Companies," unpublished paper, Harvard Business School, 2002 (available online at **http://www.hbs.edu/research/facpubs/workingpapers/papers2/0001/01-002.pdf**).

Demkes, R. "COMET: A Comprehensive Methodology for Supporting Telematics Investment Decisions," Working Paper, Telematica Instituut, Enschede, The Netherlands, 1999.

Faber, E., and Bouwman, H. "Designing Business Models for Mobile Sevices: Exploring the Connections between Customer Value and Value Networks," paper presented at the Third International Conference on Electronic Business, Business Paradigms: Strategic Transformation and Partnerships, Singapore December 10-12, 2003.

Faber, E., Ballon, P., Bouwman, H., Haaker, T., Rietkerk, O., and Steen, M. "Designing Business Models for Mobile ICT Services," paper presented to Workshop on Concepts, Metrics and Visualization, at the 16th Bled Electronic Commerce Conference eTransformation, Bled, Slovenia, June 9-11, 2003a.

Faber, E., Haaker, T., Bouwman, H., and Rietkerk, O. "Business Models for Personalised Real-Time Traffic Information in Cars: Which Route to Take," Working Paper, Telematica Instituut, Enschede, The Netherlands, 2003b.

Gulati, R., Nohria, N., and Zaheer, A. "Strategic Networks," *Strategic Management Journal* (21), 2000, pp. 203-216.

Haaker, T., Bouwman, H., and Faber, E. "Overview of Extracted Critical Design Issues from Case Studies," Working Paper, Telematica Instituut, Enschede, The Netherlands, 2004a.

Haaker, T., Oerlemans, K., Steen, M., and de Vos, H. "Freeband Business Blauwdruk Methode, Handleiding voor succesvol samenwerken bij het ontwikkelen en exploiteren van innovatieve (mobiele) ICT diensten" [in Dutch], Working Paper TI/RS/2003/105, Telematica Instituut, 2004b.

Hawkins, R. "Looking Beyond the .com Bubble: Exploring the Form and Function of Business Models in the Electronic Marketplace," in *Elife after the Dot.com Bust*, B. Preissl, H. Bouwman, and C. Steinfield (Eds), Springer Verlag, Berlin, 2003.

Hedman, J., and Kalling, T. "The Business Model Concept: Theoretical Underpinnings and Empirical Illustrations," *European Journal of Information Systems* (12), 2003, pp. 49-59

Kaplinsky, R., and Morris, M. "A Handbook for Value Chain Research," 2001 (available online at **http://www.ids.ac.uk/ids/global/pdfs/VchNov01.pdf**).

Kijl, B., and Timmerman, W. "Presence and Instant Messaging: Cross Case Analysis," Internal Deliverable TI/RS/2003/108, B4U Project, Telematica Instituut, Enschede, The Netherlands, 2003.

Kothandaraman, P., and Wilson, D. "The Future of Competition: Value Creating Networks," *Industrial Marketing Management.* (30), 2001, pp. 379-389.

Levine, J. B., and Byrne, J. A. "Odd Couples," *Business Week*, July 21, 1986, pp. 100-106

Li, F., and Whalley, J. "Deconstruction of the Telecommunication Industry: from Value Chains to Value Networks," *Telecommunications Policy* (26), 2002, pp. 451-472.

Low, J., and Cohen Kalafut, P. *Invisible Advantage: How Intangibles Are Driving Business Performance*, Perseus Publishing, Cambridge, MA, 2002.

Maitland, C., van de Kar, E., de Wehn Montalvo, U., and Bouwman, H. "Mobile Information and Entertainment Services: Business Models and Service Networks," in *Proceedings of the Second International Conference on Mobile Business*, G.M. Giaglis, H, Werthner, V. Tschammer, and K.A. Froeschl (Eds.), Osterreichische Computer Gesellschaft, Vienna, June 23-24, 2003, pp. 69-86.

Mahadevan, B. "Business Models for Internet-Based E-Commerce," *California Management Review* (42:4), 2000, pp. 55-69.

Miller, R., and Lessard, D. *The Strategic Management of Large Engineering Projects: Shaping Institutions, Risks and Governance*, MIT Press, Boston, 2000.

Osterwalder, A., and Pigneur, Y. "An E-Business Model Ontology for Modelling E-Business," in *Ereality: Constructing the eEconomy, Proceedings 15th Beld Electronic Commerce Conference*, C. Loebbecke, R. Wigand, J. Gricar, A. Puchicar, and G. Lenart (Eds.),. Bled Slovenia, June 17-19, 2002.

Pateli, A. G., and Giaglis, G. M. "A Framework for Understanding and Analysing eBusiness Models," in *Proceedings of 16th Bled eCommerce Conference on eTransformation*, Bled, Slovenia, 2003, pp. 329-348.

Petrovic, O., and Kittl, C. "Capturing the Value Proposition of a Product or Service," position paper for the International Workshop on Business Models," Lausanne Switzerland, October 2003.

Pfeffer, J., and Salancik, G. *The External Control of Organizations: A Resource Dependence Perspective*, Harper and Row, Publishers, New York, 1978.

Popescu-Zeletin, R., Abranowski, S., Fikouras, I., Gasbaronne, G., Gebler, M., Henning, S., van Kranenenburg, H., Postschy, H., Postmann, E., and Raatikainen, K. "Service Architecture for the Wireles World," *Computer Communications* (26), 2003, pp. 19-25.

Porter, M. E. *Competitive Advantage: Creating and Sustaining Superior Performance*, The Free Press, New York, 1985.

Renkema, T. Investeren in de informatie-infrastructuur. Richtlijnen voor besluitvorming in organisaties. Deventer: Kluwer Bedrijfsinformatie, 1996.

Rietkerk, O, and Timmerman, W. (Eds). "Communities of Interest: Cross Case Analysis," Internal Deliverable TI/RS/2003/110, B4U Project, Telematica Instituut, Enschede, The Netherlands, 2003.

Seddon, P., and Lewis, G. "Strategy and Business Models: What's the Difference," Paper presented at the Seventh Pacific-Asia Conference on Information Systems Adelaide, July 10-13, 2003.

Tapscott, D., Lowi, A., and Ticoll, D. *Digital Capital—Harnessing the Power of Business Webs*, Havard Business School Press, Boston, 2000.

Timmers, P. "Business Models for E-Commerce," *Electronic Markets* (8:2), 1998, pp. 3-7.

van de Kar, E., Maitland, C., Wehn de Montalvo, U., and Bouwman, H. "Design Guidelines for Mobile Information and Entertainment Services; Based on the Finder I-mode Service," Internal Case Study Report, Delft University of Technology, 2003.

Weill, P., and Vitale, M. R. *Place to Space: Migrating to e-Business Models*, Harvard Business School Press, Boston, 2001.