Business models for eGovernment services

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Abstract

Public sector information furnishes a valuable information resource for many businesses. Thus, the design of value chains across different stakeholders and corresponding business models capitalizing on public sector information is a challenge. Business models have been investigated mostly in the realms of eCommerce and rarely for public private partnerships. Thus, they are strongly tailored to financial incentives. So far, the modelling of policies and arguments have been neglected in eCommerce approaches. This paper describes a new modelling method named BMeG (Business Models for eGovernment) supporting the planning of business models for eGovernment services. BMeG facilitates the modelling of options of value chains with public and private partners, their relationships with individual advantages and disadvantages for policies. Hence, BMeG unveils business opportunities and their rationales.

Keywords

eGovernment, business models, public private partnerships, value chains, policies, authorities, BMeG model, methodology, and tool.

Biographical notes

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1 Introduction

Citizens and businesses ask for public services available anytime and everywhere. This calls for a provision of services by different access channels, i.e., Internet, mobile and fixed phone, voice server and the like as technology push for „*one-stop services and seamless government*" (innovation pull) (Wassenaar, 2000). Since these new technologies are complex (Sheng and Trimi, 2008) and public coffers are often empty (Wild and Griggs, 2006), it stands to reason that business partnerships could pool investments and risks, i.e., "cooperate" instead of "make" (MediaKomm, 2001; Software and Information Industry Association, 2001; West, 2004). This change of policy might be reinforced, if smaller authorities with lower budgets are concerned (Leenes and Svensson, 2002).

The concept of business modelling provides us with means to model the business of one or more cooperating companies, i.e., a business model specifies how a product or service is provided. According to (Bouwman, 2002) it can be framed as a conceptual model that represents the roles and relationships of an organisation, its customers and suppliers, as well as the flows of goods, information and money between these parties and the main benefits for those involved. The discussion about business models meander so far mostly through the world of eCommerce (see e.g., (Lambert, 2003)) and are strongly geared to "making money" (Rappa, 2004) as well as creating "customer value" (Keen and Qureshi, 2006). But its concepts can also be transferred to the domain of eGovernment, since public authorities are certainly also offering products and services to citizens (G2C) and businesses (G2B) according to their policies and obligations (Wassenaar, 2000). They also create values, exchange values, and overall increase public value. These services can be operated in cooperation with other commercial or public organisations in value chains (Porter, 1985), once mutual benefits have been identified.

Hence, applying business modelling to the eGovernment domain has gained attention in research since several years (Wassenaar, 2000; Kyoung and Joon-Hyung, 2002; Peinel, Rose and Sedlmayr, 2002; Jarke, Peinel and Rose, 2004; Järveläinen et al., 2007; Janssen and Kuk, 2008; Janssen, Kuk and Wagenaar, 2008; Yu, 2008). Literature in particular reveals the decisive difference between eGovernment and eCommerce services: that for public authorities the benefits of participation in such partnerships might not be purely economic, targeting financial revenues, but serve mostly political or legal reasons (Stahl, 2005). Most of this research has investigated how the multitudes of definitions and understandings of business models can be transferred from the world of eCommerce to eGovernment, and can be categorised or analysed in eGovernment specific views. But none of the research found has studied how to represent business models in the eGovernment domain in terms of conceptual models, i.e. what are the modelling entities, attributes, and relations for a business model, and which specific characteristics are needed to reflect the needs of authorities in this model. Surveys of relevant concepts are limited to textual descriptions that do not provide tool support for populating business models.

The few existing modelling approaches of value chains focus on commercial market players and their business relationships or internal interactions between departments implying monetary goals of all partners and economic value generation (Osterwalder and Pigneur, 2002), (Gordijn, J., 2002). Government-oriented benefits like *better* services or *greater efficiency* in the fulfilment of policies as public values are not on their agenda (Janssen and Kuk, 2008). The expected impact of eGovernment services is certainly not getting solvent customers, but reaching "the citizen" in an optimal and comprehensive way independent of properties, abilities, and social class (Järveläinen et al., 2007), (Stahl, 2005), and as such eventually maximising the social outcome (Moore, 1995).

Also, private organisations can in fact decide and act as they like even when fenced by stakeholders, laws, and customer demands. They can -but do not necessarily have to- publish their strategies and, moreover, their strategy deliberation. In contrast to that, public organisations are at any times under control of superior organisations up to the highest administration level, as well as eyed and judged by business and citizens, means the arbiter is the collective (Moore, 1995). And, authorities have a higher complexity of objectives, evaluation and decision criteria, as well as more legal and formal constraints with respect to courts, legislature, and hierarchy (Boston et al., 1996). Thus, authorities' decision deliberation has to be more elaborated and traceable than current business model concepts and tool support from the eCommerce world are able to capture.

The conceptual model of BMeG has been designed with regard to the business perspectives of a public authority when implementing new services. In addition, the BMeG editor serves as tool support for capturing the know-how and rationale of potential business models as variants of value chains, also for reasons of transparency concerning decisions made.

This paper is organised as follows. Section 2 presents our BMeG modelling method, which facilitates the design of various alternatives of value chains for eGovernment services. Section 3 covers application examples to demonstrate how BMeG can be applied, section 4 discusses BMeG with respect to related work and research in this area. Contribution and further work as well as the summary conclude this paper.

2 Business models for eGovernment - BMeG

From the perspective of authorities, the most important design aspects of value chains are ruled by the question of whether they should implement and operate such a kind of service alone, with other public organisations sharing risks and efforts, or whether such service might also realise an attractive business opportunity for a private stakeholder. But then, how to generate tangible as well as intangible benefits and revenues for all partners, or in other words, how to design a sustainable value chain?

Modelling such value chains depicting pros and cons enables them to "puzzle out" suitable partnerships and to select the most promising one based on an analysis according to the win-win-situation of partners. The modelling of such public-private "businesses" offers answers to which services to offer, how services to decompose, which sub-services to delegate to other partners, whether this provides benefits or disadvantages for individual partners in the value chain, and what impact does this have on policies of partners involved.

We started with projects for the dissemination of information about air quality and the dissemination of citizen services by the use of New Media. Environmental information about particulate matter or pollen plays a vital role for citizens due to resulting health impacts and missing individual advices for counter measures. Public organisations are collecting environmental information and offer it to the public, but still missing is a user-centred active dissemination to affected persons based on personal allergies and special circumstances in specific places. Providing such information turned out to be complex due to cultural conditions and local regulations. Design and operation of such services is therefore difficult to be financed by public funds, but rather need complementary support by other public and private partners. Main aim of our research was therefore to design and develop models and tools capturing the main aspects of eGovernment business models, taking also into account technical, social, and legal frameworks and goals.

We developed a new modelling method named BMeG (Business Models for eGovernment) that guides the planning of sustainable business models for eGovernment services (Peinel, Jarke and Rose, 2009). BMeG supports public and private partners to model options of value chains with public and private partners, their relationships by exchanging objects of value, and their individual advantages and disadvantages for policies depicting the benefits of partners. Since BMeG explicitly considers policies in its model, it is specifically designated for eGovernment services. Although not confirmed by our project experiences, the modelling method might also be useful for planning eCommerce business models, once policies become more important in light of corporate governance than the mere financial value generation by involved partners.

In the following, we present the BMeG method showing how business models with roles, relationships, organisations, flows of goods, and in particular benefits have been (1) conceptualized by a model, (2) accompanied by a modelling procedure, and (3) supported by a graphical editor designed for value chains of eGovernment services.

2.1 The BMeG model

The *BMeG model* is based on the following propositions:

- An eGovernment service can be planned in different variants of *value chains* with at least two different *partners* and *object exchanges* between these partners (the end customer, e.g., the citizen, is also seen as partner). Partners in public private partnerships are complementary according their tasks in such a value chain (MediaKomm, 2001). This is implemented in BMeG through the concepts of *roles* and *services* (tasks), hence different partners occupy different roles providing complementary services.

- Each partner in a value chain has *advantages* and *disadvantages* (arguments) in its role. These arguments have respective positive or negative impacts on *policies*)* of partners. By assessing these advantages and disadvantages, the modeller can predict whether a value chain can produce a win-win-situation for all participants, i.e., the advantages of each partner outbalance its disadvantages. Such "positive" value chains will likely be more successful than "negative" partnerships.

- Also, different possible financing options (i.e., funding, sponsoring, advertisements, payment, hosting, shared operation) of eGovernment services can be modelled by means of different object exchanges between partners.

- Financial aspects like spreadsheet calculations of the amount of exchange values are not emphasised; monetary values could be charged among partners, but do not necessarily have to be. And also for commercial partners a participation in eGovernment projects could be valued as strategic method for marketing or support of other business services.

- Particularly, investments for public services might not be reimbursed monetarily, because public authorities often follow legal obligations and eGovernment perspectives by serving citizens. The return value for the authority would be the successful impact of such a service, e.g., more citizens are informed. This leads to the BMeG design rule that no quid pro quo is required in BMeG though it can be modelled if of interest. A return value can also come from a different partner in the value chain, or from no one.

Figure 1 depicts this BMeG model in entity relationship notation. The following paragraph details the main concepts of the BMeG model:

- *Value Chain:* A value chain represents a variant of an eGovernment service with different partners in respective roles. Each value chain variant is identified by a distinct name. It stands for one option of a partnership of an eGovernment service.

- *Partner:* The entity partner describes an actor in a value chain. It normally represents an organization, i.e., an enterprise or an authority, or a person like a citizen. The concept is similar to the actor in business process modeling or other business modeling methods. A partner is normally in exactly one role, following own policies and having advantages or disadvantages for participation. Each partner exchanges at least one object with another partner.

- *Role*: A role comprises essential functions of a partner in a value chain. These functions are described in BMeG with the term services. A role can offer services, and/or a partner in a role can offer services. Roles are complementary in business models and such also in BMeG.

- *Object exchange:* describes the value exchange between partners, while values in BMeG represent *objects* like data, information, goods, or financial amounts.

- *Policies:* stand for the guiding principles of an organization, e.g. a company, person or authority. Policies consist of, and elaborate the principles on which decisions are taken (Behm, Bennington and Cummane, 2000) and as such they also represent rules of conduct, moral concepts, and more, being time and project independent. They might be falsely formulated similar to goals, but

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*) The term policy does not relate to pure governmental context, but describes in general "a high-level overall plan embracing the general goals and acceptable procedures" (Merriam Webster, 2008).

it has to be noted that polices might reflect several inherent goals and general conditions without explicit notion, which is typical for authorities due to regulations and public policy. In BMeG, policies are entered as free text.

- *Advantages* and *disadvantages:* serve as expression of arguments of a participation of a partner in a value chain. They have direct positive or negative impacts on policies of the respective partners, but can also influence policies of other partners.

- A *service* in BMeG describes in more detail the functions a role provides. Several partners in the same role might offer different services. This term should not be confused with the overall eGovernment service planned even similar in naming. Note, that these BMeG services do also not relate to the term process coming from the business process modeling world. Services might be detailed by processes in other modeling endeavors, but they are not equivalent and in this context not relevant.

Figure 1 BMeG Model in ER Notation
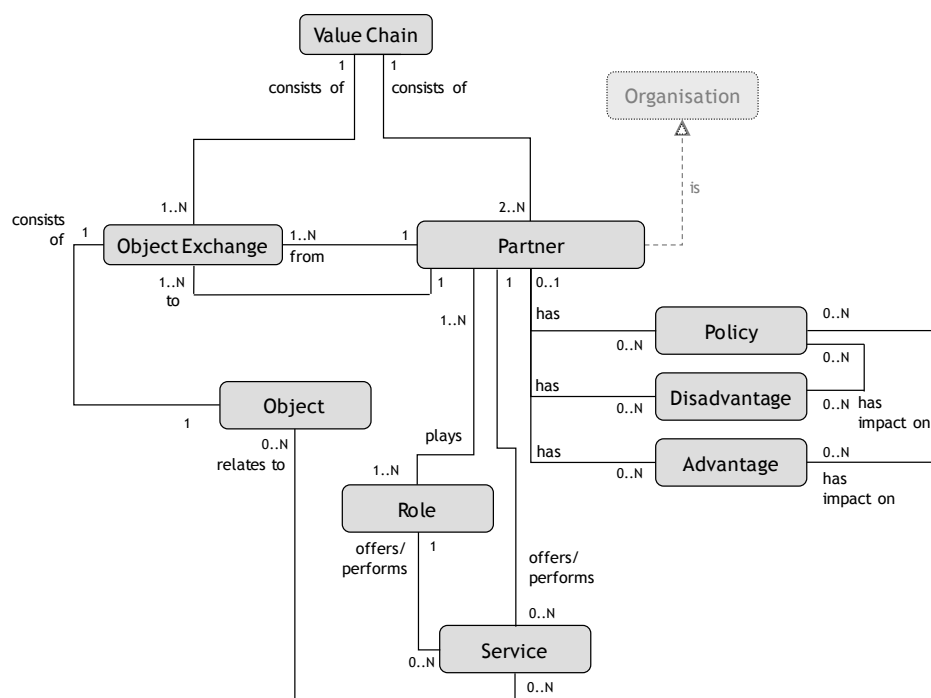
2.2 The BMeG modelling approach

The *BMeG modelling approach* is defined as follows. Assume an authority plans to implement an eGovernment service and thinks about a partnership with other organisations. The steps to model a possible value chain with BMeG are shown in Figure 2.

Our approach starts after a clarification of the policies of the modelling authority (might already be done in previous modelling projects). Further steps are as follows:

1) Clear definition of the service (target customer, channels,…), then identification and structuring of single activities that can be executed independently as sub-services;

2) Deduction of roles offering these activities (later also merging of roles due to specific partners);

3) Negotiation with potential partners to find out their incentives, rationales, and thus policies, plus identification of possible object exchanges and financing options; Then, definition of organisations as possible partners;

4) Aggregation of roles according to the partners selected;

5) Definition of object exchanges between these partners;

6) Definition of partner policies and their arguments for participation, including the definition of the advantages and disadvantages for the modelling authority. Derivations of possible cross influences (arguments of one partner have influence on policy of another partner).

All these steps are not meant to be done strictly sequentially, but refinements are possible and indicated due to further classifications or more information received from partners during negotiations. Note that partners like external investors or public funders should also be modelled as financial roles. This is in particular expedient for recording their funding goals and sponsoring demands.

By re-iterating this approach different value chain alternatives with the same combination or with different partners can be created, with respective equal or different financing options. Then, analysis can commence, i.e., a comparison of advantages and disadvantages per partner and value chain, and thus an estimation can take place concerning whether a win-win-situation can be reached in one of these alternatives. Hence, the sustainability of the value chain's operations can be assessed.

Figure 2   BMeG Modelling Approach
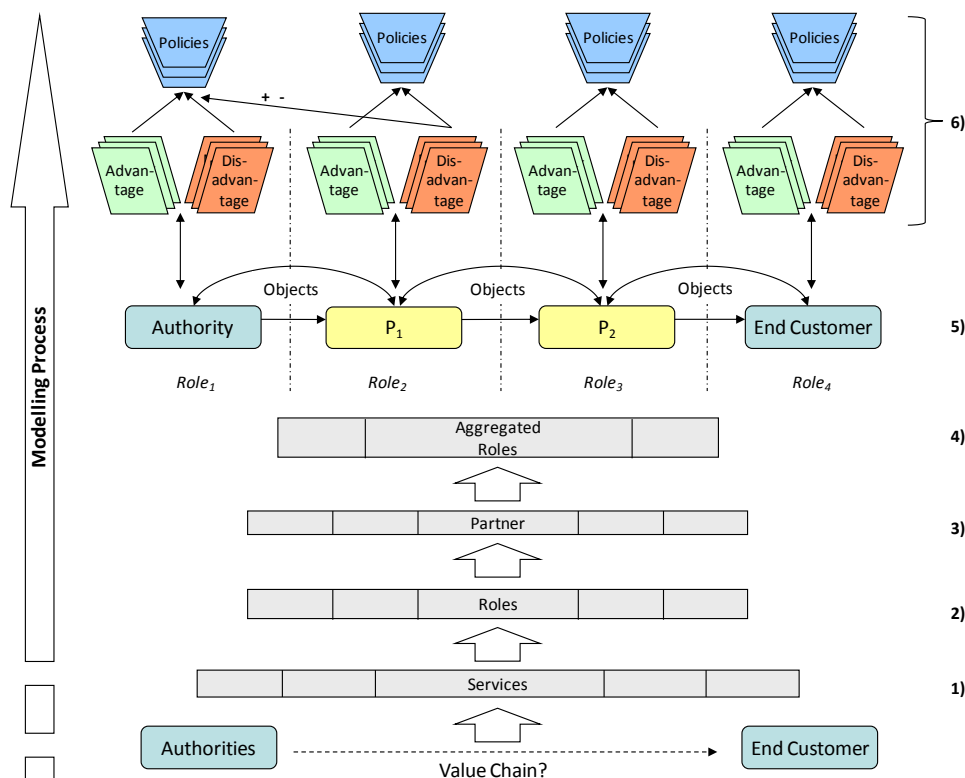

2.3   The BMeG editor

Modelling methods are not accepted unless supported by interactive tools which simplify the capture of information and offer effective presentations of those aspects of a model which are most important for decision makers. Hence, the BMeG editor serves as tool support for capturing the know-how

and rationale of related business models as variants of value chains, also for reasons of transparency concerning decisions made. The editor supports the modelling of value chains and exchange relationships, and makes effective use of a graphical folder concept to deal with abstraction within highly complex models.

The design of the BMeG editor has emerged in a long iterative process with many different users and design alternatives (see (Peinel, 2008) for details).

Figure 3 presents the BMeG editor. The left frames show project and variant trees for selection, and re-usable concepts (stored in a database) like organisations, roles, policies, and services. They can be edited in the tree data structure and dragged to the central graph panel (in the middle). The right frames are designated for overview and detail view purposes (overview image for zooming and orientation, and below a properties table of each selected node or edge in the graph panel). The central graph panel is organised in tabs, each representing one variant of value chains. Above each graph panel, a toolbar is located allowing typical graph functions like zooming and panning as well as grouping and layout functions of the editor.

**Figure 3**   The BMeG Editor
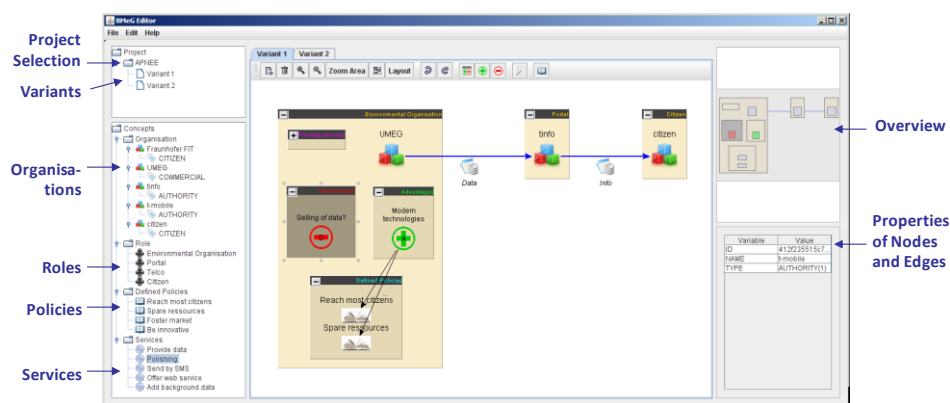
The graph panel with nodes and edges serves as main modelling frame. Entities of the BMeG model like organisations, roles, policies and services are dragged from the left lower frame to the graph panel and dropped. Object exchanges are modelled with directed and attributed edges between roles or organisations. Any attributed icon can be arbitrarily labelled.

Assignments like "organisation has advantage" or "organisation has policy" are ideally not represented by means of directed edges (even edges for drawing are usable), but by placement in common folders. This graphical cuteness for user comfort "saves edges" and thus fosters readability and clarity of larger models. Also, it allows one to model the sharing of policies, advantages, or disadvantages between organisations by just placing them in the same folder.

Organisations as well as advantages, disadvantages, services, and policies can also be grouped in folders that can be opened and closed depending on the modeller's current detail of interest.

All objects can be placed freely on the panels. Moving them causes all sub and surplus folders or edges to follow their motion or to enlarge. Layout functions allow one to re-arrange all icons according to graph layout algorithms (hierarchical, organic, or orthogonal layout), which prevents the user to be visually trapped in too large or complex models.

Figure 4: Core entities of the BMeG Model in the Editor
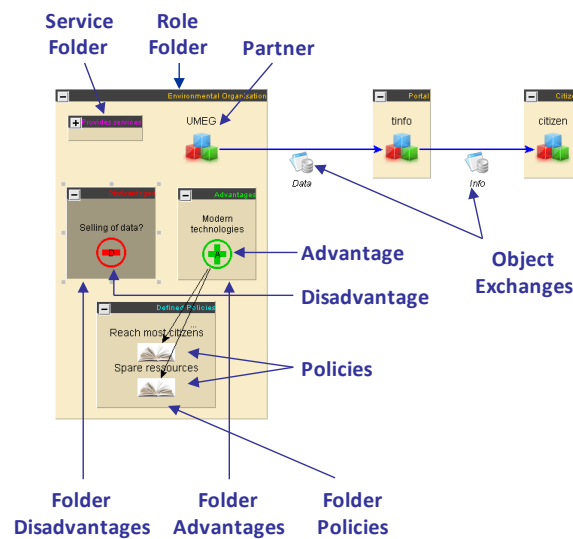
In summary, the entities of the BMeG meta model are implemented as follows:

Object nodes:	Folder nodes:	Edges:
Partner	Partner (optional)	Object exchange (attributed with labelled icon)
Advantage	Role	Relations „advantage or disadvantage has impact on policy" (optional with label)
Disadvantage	Services	
Policy	Advantages	
	Disadvantages	(other relationships by directed edges are also possible)
	Policies	

2.4   On the notion of "value"

The authors distinguish the term public value from the term value and value generation as normally used in business modelling context (Timmers, 1998; Gordijn, Jaap, 2002; Osterwalder, 2004). Public value is understood to be the achievement of favoured outcomes by the use of public resources in the most effective manner available (Moore, 1995). This outcome can be classified as service values, citizen values, business values, government employee values, organization values, service chain values, institution values, administration values, society values, and nation values (Yu, 2007), (Yu, 2008).
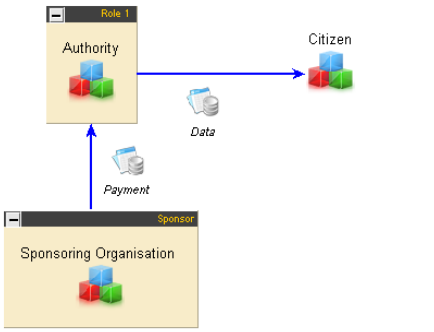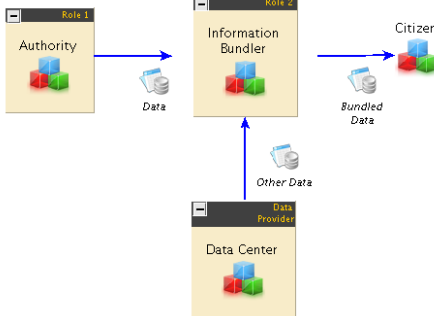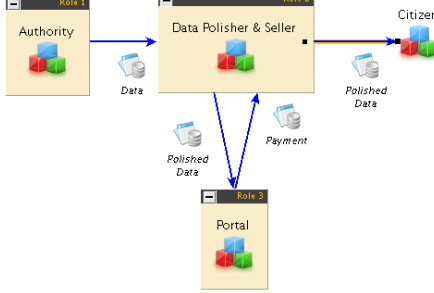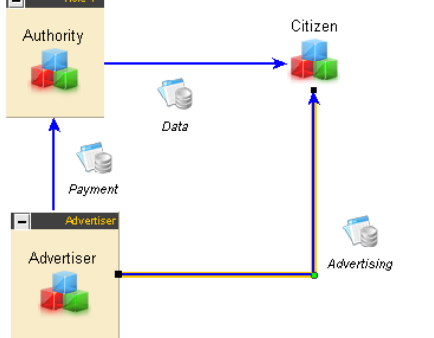
But, most examples we faced when planning partnerships for eGovernment services do not model *public value* for one partner or exchange of *public values* between partners. Rather, objects of *value* like information, money and goods are exchanged, creating public values of different types often by the sole functioning of the value chain. To come back to the environmental example: values exchanged have been data, money, and polished information; but not the public value(s) "awareness of citizens, resulting in changes of behaviour causing better health and also environmental improvements, as well as the fulfilment of policies". Such public values can be described by policies and advantages in BMeG, but they can not be expressed by current eCommerce modelling methods. In particular, (esp. monetary) values have to be related to individual partners explicitly, while public values can often not be assigned to one or more specific partner.
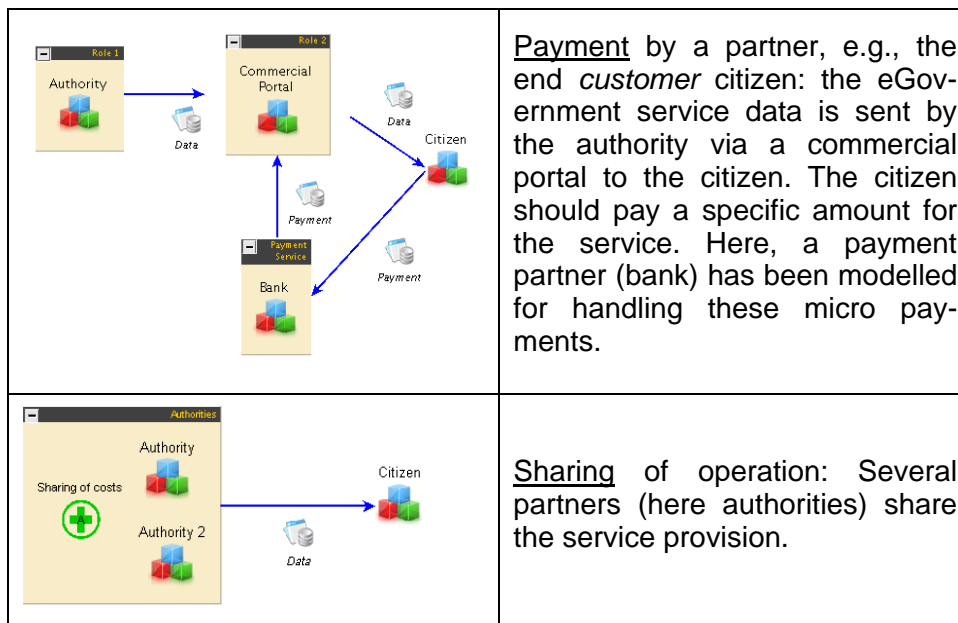
3   Modeling examples

3.1   Revenue models

Apart from assessing the advantages of partnerships, authorities are certainly also interested in ways of how eGovernment services can be co-financed to lower the burden of the treasury. These can be described by revenue models, that is, underlying financial flows, and the revenues and costs associated (E-Business Strategies (EBS), 2007). The following examples show how revenue models can be planned with the BMeG editor.

	<u>Sponsoring</u>: one (or more) partners of the value chain delivers monetary values by an object transfer (payment). The service to the citizen will be marketed with the name of the sponsor (funding model would be similar).
	<u>Bundling</u>: services can by combined with other services coming from a different provider (modelled here as additional partner "Data Center" in the value chain)
	<u>Re-selling of data</u> of service: one of the partners gets additional revenues by selling the polished data to a third party (here Portal). The resulting revenue can be retained or shared.
	<u>Advertising</u>: one partner gives monetary values to the authority (payment), the advertiser can directly contact the citizen (or the service to the citizen includes advertisements).

	<u>Payment</u> by a partner, e.g., the end *customer* citizen: the eGovernment service data is sent by the authority via a commercial portal to the citizen. The citizen should pay a specific amount for the service. Here, a payment partner (bank) has been modelled for handling these micro payments.
	<u>Sharing</u> of operation: Several partners (here authorities) share the service provision.

Certainly, these financing options can be combined to cover a portfolio of revenue models.

3.2   Project APNEE

BMeG has been evaluated in a number of large European information society projects dealing with air quality monitoring, city governance, as well as emergency management. Initially, BMeG has its roots in the EC funded project APNEE (Air Pollution Network for Early Warning and Information Exchange in Europe) (Peinel and Rose, 2004). APNEE evaluated the feasibility of generating revenues with information services revolving around environmental data; or at least to create a win-win-situation between public and private partners when operating the service. The project implemented ubiquitous information services available on different channels like mobile phones (WAP, SMS, MMS), PDA, street panels, voice servers, and Internet. These services were operated in public private partnerships while each partnership creates dedicated value for the citizen as *customer*.

Figure 5 shows an example of such a partnership: the APNEE value chain for Germany. Partners have been a German environmental authority, an information service provider serving telecommunication companies (TelCo InfoService), a mobile telecommunication provider offering also WAP and SMS services, and the citizen as end customer.

The environmental authority delivers its measured and quality assured air quality data to partner TelCo InfoService for further processing and final delivery to the customer – the citizen. As role specific services the authority has to provide the data and an air quality index (AQI). Its policy is to spare resources, to be innovative, to implement regulations and to reach most citizens with this information. Its advantages for participation in this value chain are the innovative spread of information by mobile phone, sparing of resources since it does not have to implement the service itself, and that it even gets paid by the information service provider for data delivery.

The TelCo information service provider as directory service picks up the data, bundles it with other data like weather and pollen news, and geo-references it on a map for Internet access. It also provides the mobile carrier with the polished data for selling it as bundled service on their WAP portal. The advantage of the TelCo InfoService in this partnership is that they get new and qualified data for offering, but as disadvantages they have to pay for the data supply and only a niche market might want to access the service via the mobile carrier and pay for it.

Figure 5   Application of BMeG to Project APNEE-TU: value chain model of Germany
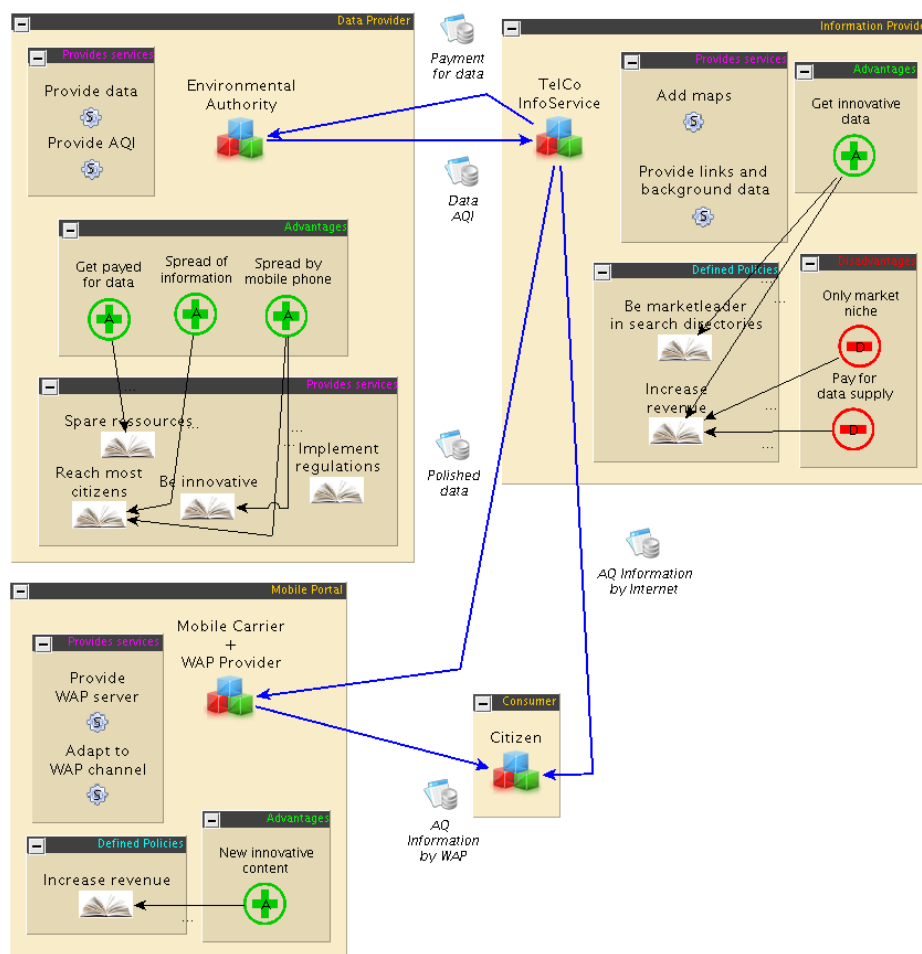
We detail the value chain from figure 5 by describing in table form which values are exchanged between which chain participants, which roles and services are modeled, and which partner which policies follow and arguments for participation found:

Partners	in Roles	Services (offered)
Environmental Authority	Data Provider	Provide data Provide AQI
TelCo InfoService	Information Provider	Add maps Provide links and background data
Mobile Carrier + WAP Provider	Mobile Portal	Provide WAP server Adapt to WAP channel
Citizen	Customer	-

The following value exchanges are modelled:

From	To	What (Object)
Environmental Authority	TelCo InfoService	Data AQI
TelCo InfoService	Environmental Authority	Payment for data
TelCo InfoService	Citizen	AQ information by Internet
TelCo InfoService	Mobile Carrier + WAP Provider	Polished data
Mobile Carrier + WAP Provider	Citizen	AQ information by WAP

The partners have the following policies, and due to their partnership policy related advantages and disadvantages.

Partners	Policies	Advantages	Disadvantages
Environmental Authority	Spare resources	Get paid for data	
	Reach as many citizens as possible	Spread of information Spread by mobile phone	
	Be innovative	Spread by mobile phone	
	Implement regulations		
TelCo InfoService	Be market-leader in search directories	Get innovative data	
	Increase revenue		Only niche market Pay for data supply
Mobile Carrier + WAP Provider	Increase revenue	New innovative content	
Citizen	*not modelled*		

The BMeG model clearly unveils, that the advantages of this value chain lied on the side of the authority, but the disadvantages on side of the commercial partner TelCo InfoService. And in fact, this partnership broke, when the latter changed its policy of being a search directory (syndicating sources from the market) to being a search engine (working on in-house sources like address data). If the authority had supported the partnership with financial reimbursement or by signing a marketing agreement over the commercial use of the data, at least the niche argument as well as the pay-

ment counter arguments might have been equalized for the TelCo InfoService company. Then, the partnership might have survived as secondary service even a business policy had changed.

Project APNEE showed also that such partnerships strongly depend on local conditions. This means that value chains for eGovernment services vary highly concerning content and channels in different countries and regions due to cultural acceptance, market situation, regulations, and more (Peinel and Rose, 2004). And this was the starting point of the question on how to plan these different value chains, which ought to be "profitable" for different stakeholders while by the same time serve citizen needs.

4   Related work

When talking about business models and value chains, business process modelling approaches emerge as possible solution for modelling and editing, because business process modelling solutions are also claiming to model co-operations of enterprises in value chains (see, e.g., (Hofer et al., 2003)). But business process modelling and business modelling serve different objectives (Gordijn, Akkermans and van Vliet, 2000) and have different entities. Although we found two explicit business modelling methods, we argue that their concentration on monetary values in the frame of eCommerce is not sufficient for our domain, but tangible and intangible benefits are the main decision points. Only the requirements engineering method i* accompanies us a short way by employing the concept of goals as modelling paradigm (Yu, 2008). This has been sophisticated by us to represent policies and by introducing arguments pro and con that impact these policies respectively.

Among the few existing modelling proposals for business models, the e3value method describes a value proposition using a conceptual value model that shows how actors create, distribute, and consume objects of economic value (Gordijn, J., 2002). This ontology can represent a network of actors that jointly offer a complex product or service consisting of separate products and services (Gordijn and Akkermans, 2001). e3value introduced the terms actors and value objects, which are also used in BMeG. Also, the initial visualization in BMeG was inspired by the e3value editor. But, in BMeG, no counter value is required from a cooperating partner, since we argue that values can also come back from a different partner, or not at all, because the overall functioning of the chain (e.g., the impact on the citizen) might be the whole return for the authority. Economic calculations about expenses and return are thus less emphasized than in e3value, but a thorough financial analysis might be added to BMeG, even it is well known that the assessment of investment and fulfilment of public policies is hard to assess (Wolf and Krcmar, 2006). e3value does not support concepts like policies, advantages or disadvantages. Differences between value chains can thus not be evaluated apart from the sum up of financial flows. We argue that this is not sufficient for the decision making of authorities about public private partnerships.

The BMO (Business Model Ontology) methodology (Osterwalder, 2004) describes the business model of an enterprise in an UML-like style, presenting a "conceptualization and formalization into elements, relationships, vocabulary and semantics of the essential subjects in the e-business model domain" (Osterwalder and Pigneur, 2002). Similar to e3value, the main aim is the modelling of commercial partnerships in an extensive and explicit way. Due to this detailedness it serves more for describing an existing business than planning a new, fictive one. BMO also considers actors like BMeG and e3value, but its main concentration is on activities. In BMeG, activities are represented by the concept of services, but their specification is not the key of the model. Currently, BMO is missing tool support such as an instantiation editor. This is a main component in BMeG, since authorities should try out several options and compare the visible results for a final decision about which choice to take. It is unclear, how different variants of value chains can be compared in BMO.

The i* methodology supports the modelling of complex strategic relationships between actors of organisations. "Actors depend on each other for goals to be achieved, tasks to be performed, and resources to be furnished. Networks of strategic dependencies can be analyzed for opportunities and vulnerabilities. Means-ends reasoning is used to help explore alternatives" (Yu, 1999). This method is applied in the requirements engineering phase of software system development processes for the modelling of goals. Goals describe here objectives that a software or system should achieve through cooperation of actors in the intended software and in the environment (Yu, 2002).

Through its closeness to BMeG concepts (actors - partners, goals - policies, arguments - impacts), it is possible to model value chains with i*, but i) soft goals do not represent the overall policies of authorities, rather soft goals result from policies in our approach; ii) i* goals are "satisfied" by tasks, but value chains may fulfil policies by their general impact; iii) missing in the i* model is the grouping of actors offering together a service, but with different policies/goals; vi) i* possesses entities which are not required for business models, like agents, positions, or links; v) existing editors for i* models do not depict which advantages or disadvantages different models have.

Nevertheless, i* is the only methodology, which is at a similar level of strategic abstraction from specific processes we require for the BMeG setting. And it can thus be seen as an important precursor of our, more domain-specific approach.

With relation to eGovernment business models literature/research we argue that most eGovernment business model research discuss the application of the concept to eGovernment or how to add an eGovernment specific taxonomy (like (Janssen, Kuk and Wagenaar, 2008)). But we found no one dealing with the concepts of formal modelling of such value chains taking into account eGovernment specific needs. (Janssen and Kuk, 2007), and (Yu, 2008) started going down this avenue by pinpointing the challenges of coordinating public service networks based upon a framework for designing and analyzing e-Government business models. But this framework results in either textual descriptions or informalized graphs, which can only partly be used to feed an IT-based modelling support. Also, such frameworks are geared towards understanding and analyzing an existing endeavour and its deeper relations (like business processes), while BMeG focuses on the start, planning, and moreover negotiation phase of it: to decide which partners to take on board for which gain and loose. Processes, coordination, resources and the like are therefore details our users did not want to discuss or elaborate at first hand. We are already planning to extend BMeG to more comprehensive "views" (as elaborated by the authors above) and also further modelling requirements. But we doubt that we will extend our model, rather we tend to create links to well established, but adapted business process as well as business motivation modelling tools.

We also would like to reiterate that we do not relate the value exchange of business models as origin or source of public value (Prakash, Jaiswal and Gulla, 2009). The focus of BMeG is the modeling and assessment of value chains that are operated by public and private partnerships. The intention of BMeG is to offer public authorities a methodology and a tool to design partnerships for operating services. Such services by nature originate from public values to be generated, be they social or environmental values. Once such services have been decided as measures for public value generation, the question arises of how to operate such services und in particular how to operate such service in a sustainable manner. The assessment of the sustainability is the prime driver of BMeG: how to design a value chain that sustains while prioritizing the policies of involved stakeholders. Hence, public value is the starting point of our service design while the service is a measure to generate public value. Then, BMeG supports the elaboration of business models for implementing the measure.

We argue that public value can -but not necessarily must- be depicted by such modeled value chains. For example, a "good environmental impact" might be a public value "created by" "informed citizens", but no value of this type is exchanged in the related business model. BMeG does currently not foster the optimization of public values. Rather it helps to depict advantages and disadvantages for policies. An investigation about the relationships of these arguments to public value(s) is still ongoing but problematic due to the varying definitions of public value as well as difficult valuations.

Information transparency could be the driving public, social and environmental value for service creation. And we argue that for example not each information service (G2B) creates only citizen values being citizens the sole public beneficiaries (Yu, 2008). Informing the public about "bad" information to cause a change of their behavior can also create social value or environmental value.

5   Contribution and future research

We developed the BMeG method showing how business modelling concepts have been abstracted, framed by a modelling procedure and supported by a graphical editor. Partners in BMeG value

chains have object exchanges, which must not be mutually dependent. Financing options and costs can be modelled with the exchange of monetary objects, and the concept of "policy" in particular pinpoints to legal regulations, the mission of an authority (Ghapanchi, Albadvi and Zarei, 2008), as well as the business policy of a company. The assignments of advantages and disadvantages per partner allow one to represent arguments for participation by having a bearing on ruling policies. The BMeG editor has been designed as tool support for capturing the know-how and rationale of related business models. It makes it possible to model and maintain different variants of value chains, also for reasons of transparency.

The policy of modelling yields to a formal representation of real-world artefacts, be it entity-relationship models for information systems engineering or workflow models for customer relationship management. Eventually, a formal model allows one to assess certain properties of the domain represented, e.g. performance characteristics. Besides these opportunities for assessment, modelling fosters transparency in first place. In our case, the formal representation of business models unveils the types the value propositions, the stakeholders involved and their respective objectives for participation in the partnership, value chains, etc. Hence, business interests and added-valued materialized can be realized and followed by other parties and partners promoting inter- and intra-organisational transparency. And hence, a formal model will create an understanding of alternatives since various alternatives can be captured and analyzed with regards to strengths and weaknesses. Moreover, dedicated analysis checks can assess a value chain with regard to its sustainability, which might be harmed by conflicting interests of partners.

Thus, inter- and intra-organisational transparency emerges as chief benefit of any modelling effort. In our case, this transparency enables a mutual understanding of business interests and services by partners involved in a public private partnership. Therefore, the motivation for participation is known. Moreover, different alternatives for a business model can be designed to check alternative models for value generation or partnership. Besides fostering transparency, business models can also be shared and reused for different service opportunities in the sense of best practice transfer.

As already mentioned, we concentrated on the planning phase of eGovernment services, i.e., which options to create and operate such a service in partnership with which arguments are possible, and then to select the most promising one.

Further research will include

- How to extend the BMeG model or link it to other concepts or views of interest (like business processes, business motivations, goal modelling, and eGovernment view points like coordination and environment).

- How to optimise the creation of public value in relation to resources and efforts used. Here also the relation of "normal" value transfers from the business model literature to the concept of public value is of interest. Do they implicate or subsume each other? Or is the first one just an exchange of resources or capabilities?

- How to enhance the support of users with analysis and help functions for the design of value chains:
    - comparing value chains and depicting differences
    - if a negative argument of one chain does not appear in the other chain, does this implicate a positive argument?
    - value compilation (average, summery per partner), if values exchanged are monetary or countable of any kind.
    - arguments could also have different strengths and respective impacts. How to support the user in assigning strengths to arguments, how to depict a negative impact?

- Are the entities of the model, its relations, the method and the editor also a useful solution when modelling from a commercial point of view? This could be a commercial partner planning a public private partnership. And will it also work for planning a commercial value chain consisting of partners or departments?

And finally the question arises of how important goals and objectives in the modelling of business models and value chains are. In the requirements engineering domain, goals and goal-oriented design deliberation methods are scientifically well established. In particular, the process of deliberation is well established while commercial methods at best just record goals and objectives without any information about deliberation. And whether the eGovernment domain is specifically predestinated for the scrutiny of objectives due to complexity and transparency demands?

6   Summary

In this paper, we presented the BMeG method for the modelling of business models allowing authorities to design different options of value chains for eGovernment services. Partners in these value chains have different object exchanges, which can be, but need not be, mutually dependent. With the exchange of monetary objects, financing options and costs can be modelled. The concept "policy" reflects legal regulations, the mission of an authority as well as the business policy of a company. The assignments of advantages and disadvantages per partner allow the modeller to represent arguments for participation by having a bearing on ruling policies. As tool support the BMeG editor was presented, which facilitates to model and to file these different variants of value chains for later change and reuse.

So far, eGovernment services have not been studied in a conceptual manner with respect to policies and strategic advantages and disadvantages. BMeG strives to make strategic alliances of private and public partners transparent in order to assess their sustainability. Rather than focusing on design issues, channels, and interfaces of potential solutions, the roles and benefits of the stakeholders along the value chain are of equal importance.

The BMeG model, methodology, and tool have been evaluated in a number of large-scale European projects. The approach has been essential to develop and evaluate different dissemination channels and business models for the dissemination of air quality information in five different European countries in project APNEE. BMeG also helped four European regions to compare their very different strategic approaches on how to deal with typical problems currently facing city and rural governance in a project named Use-Me.GOV. The availability of a focussed, domain-specific solution, dedicated to eGovernment issues allowing traceability of decisions proved to be a key success factor in all of these case studies, rather than just considering process modelling issues or purely commercial value generation.

BMeG concentrates on eGovernment services accentuating policies and arguments to assess and thus choose an optimal partnership. The application of BMeG to other eGovernment activities or other domains and its usefulness is currently in research stage.

References

Behm, A., Bennington, L. & Cummane, J. (2000) 'A value-creating model for effective policy services', *Journal of Management Development*, vol. 19, 3, pp. 162-178.

Boston, J., Martin, J., Pallot, J. & Walsh, P. (1996) *Public management: the New Zealand model*, Oxford University Press, USA.

Bouwman, H. (2002) 'The Sense and Nonsense of Business Models', paper presented to International Workshop on Business Models, Lausanne, 4-5 October 2002.

E-Business Strategies (EBS) (2007) *Portal Revenue Models*, viewed 10/2007, <http://www.ebstrategy.com/mobile/articles/port_rev_mod.htm>.

Ghapanchi, A., Albadvi, A. & Zarei, B. (2008) 'A framework for e-government planning and implementation', *Electronic Government, an International Journal*, vol. 5, 1, pp. 71-90.

Gordijn, J. (2002) 'e3value in a Nutshell', paper presented to International workshop on e-business modeling, HEC Business School, Lausanne.

Gordijn, J. (2002) 'Value Based Requirements Engineering: Exploring Innovative e-Commerce Ideas', Vrije Universiteit Amsterdam.

Gordijn, J. & Akkermans, H. (2001) 'Designing and Evaluating E-Business Models', *IEEE Intelligent Systems*, vol. 16(4), pp. 11-17.

Gordijn, J., Akkermans, J. M. & van Vliet, J. C. (2000) 'Business modelling is not process modelling', *Proceedings of the Workshops on Conceptual Modeling Approaches for E-Business and The World Wide Web and Conceptual Modeling: Conceptual Modeling for E-Business and the Web*, vol. 1921, Lecture Notes In Computer Science, pp. 40–51.

Hofer, A., Adam, O., Zang, S. & Scheer, A. W. (2003) 'Architektur zur Prozessinnovation in Wert-schöpfungsnetzwerken', *Veröffentlichungen des Instituts für Wirtschaftsinformatik, ed: Prof. August-Wilhelm Scheer*.

Janssen, M. & Kuk, G. (2007) 'E-Government Business Models for Public Service Networks', *International Journal of Electronic Government Research*, vol. 3, 3, pp. 54-71.

Janssen, M. & Kuk, G. (2008) 'E-Government Business Models: Theory, Challenges and Research Issues', in M Khosrow-Pour (ed.), *E-Government Diffusion, Policy and Impact: Advanced Issues and Practices*, IGI Global, Hershey, USA, pp. 1-12.

Janssen, M., Kuk, G. & Wagenaar, R. (2008) 'A survey of Web-based business models for e-government in the Netherlands', *Government Information Quarterly*, vol. 25, 2, pp. 202-220.

Jarke, M., Peinel, G. & Rose, T. (2004) 'Public-Private Partnerships in Wertschöpfungsketten für ubiquitäre Informationsdienste ', *IM Information Management & Consulting, Sonderheft zum 50. Geburtstag von Helmut Krcmar*, vol. 19, pp. 47-55

Järveläinen, J., Koskivaara, E., Pihlaja, P. & Salmela, H. (2007) 'Value-Creating E-Government Business Models for Early Education Childhood Education in Finland', *International Journal of Electronic Government Research*, vol. 3, 3, pp. 72-86.

Keen, P. & Qureshi, S. (2006) 'Organizational transformation through business models: a framework for business model design', in: *Proceedings of the 39th Hawaii International Conference on System Sciences*, Kauai, Computer Society Press.

Kyoung, J. & Joon-Hyung, H. (2002) 'Development of an e-government service model: a business model approach', *International Review of Public Administration*, vol. 7, 2, pp. 109-118.

Lambert, S. (2003), *A Review of the Electronic Commerce Literature to Determine the Meaning of the Term 'Business Model'*, School of Commerce, Flinders University of South Australia, <http://www.ssn.flinders.edu.au/commerce/researchpapers/03-5.pdf> viewed 2/2004.

Leenes, R. E. & Svensson, J. (2002) 'Size Matters - Electronic service delivery by municipalities?', in: RTaK Lenk (ed.), *Electronic Government - First International Conference, eGov 2002*, September 2-5, 2002, Aix-en-Provence, France, pp. 150 - 156, Springer, Berlin/Heidelberg.

MediaKomm (2001), *Betreibermodelle für kommunale Portale im Internet, Analysen - Konzeptionen - Lösungen*, <http://kommforum.difu.de/upload/files/beitraege_aufsaetze/192/Kraft_Betreibermodelle_Esslingen.pdf> viewed 10/2007.

Merriam Webster (2008) *Online Dictionary*, viewed 11/2008, <http://www.merriam-webster.com/dictionary/policy>.

Moore, M. (1995) *Creating public value: Strategic management in government*, Harvard University Press, Cambridge, Massachusetts, London, England.

Osterwalder, A. (2004) 'The Business Model Ontology - A Proposition in a Design Science Approach', Docteur en Informatique de Gestion thesis, Université de Lausanne.

Osterwalder, A. & Pigneur, Y. (2002) 'An e-Business Model Ontology for the Creation of New Management Software Tools and IS Requirement Engineering', paper presented to CAiSE'2002 Doctoral Consortium, Toronto, 2002.

Peinel, G. (2008) 'Planung und Umsetzung von Geschäftsmodellen für eGovernmentdienste in Public Private Partnerships', Ph.D. thesis, RWTH Aachen.

Peinel, G., Jarke, M. & Rose, T. (2009) 'Business models for eGovernment -- the BMeG method', in: H Hansen, D Karagiannis & H-G Fill (eds), *Internationale Tagung Wirtschaftsinformatik (WI2009)*, Wien, vol. 1, pp. 57-66, Österreichische Computergesellschaft (OCG).

Peinel, G. & Rose, T. (2004) 'Dissemination of Air Quality Information: Lessons Learnt in European Field Trials', paper presented to EnviroInfo 2004, Geneva, Switzerland.

Peinel, G., Rose, T. & Sedlmayr, M. (2002) 'Air Quality Portals - Designing Citizen-centred Supply Chains for the Dissemination of Air Quality Information', in: W Pillmann & K Tochtermann (eds), *EnviroInfo*, Vienna, September 25-27, 2002, ISEP.

Porter, M. E. (1985) *Competitive advantage*, Free Press New York.

Prakash, N., Jaiswal, M. & Gulla, U. (2009) 'A conceptual framework for measuring public value of enterprise applications', *Electronic Government, an International Journal*, vol. 6, 3, pp. 307-326.

Rappa, M. (2004) *Business Models on the Web, Managing the Digital Enterprise*, viewed 12/2009, <http://digitalenterprise.org/models/models.html>.

Sheng, H. & Trimi, S. (2008) 'M-government: technologies, applications and challenges', *Electronic Government, an International Journal*, vol. 5, 1, pp. 1-18.

Software and Information Industry Association (2001) 'Promoting Public-Private Cooperation in e-Government - Not Competition', in CICaiA Committee (ed.), *Briefing Book Outline: E-Government*.

Stahl, B. C. (2005) 'The Ethical Problem of Framing e-Government in Terms of e-Commerce', *The Electronic Journal of e-Government*, vol. 3, 2, pp. 77-86.

Timmers, P. (1998) 'Business Models for Electronic Markets', *Journal on Electronic Markets*, vol. 8, 2, pp. 3-8.

Wassenaar, A. (2000) 'E-governmental value chain models - E-government from a business (modelling) perspective', in: *11th International Workshop on Database and Expert Systems Applications*, pp. 289-293,

West, D. (2004) 'E-government and the transformation of service delivery and citizen attitudes', *Public Administration Review*, vol. 64, 1, pp. 15-27.

Wild, R. & Griggs, K. (2006) 'A funding choice decision model for financing promising e-government services', *Electronic Government, an International Journal*, vol. 3, 3, pp. 241-255.

Wolf, P. & Krcmar, H. (2006), *Wirtschaftlichkeit von elektronischen Bürgerservices - Ergebnisse zweier Fallstudien*, AS Stiftung, Stuttgart, <http://www.winfobase.de/lehrstuhl/publikat.nsf/intern01/AD587ADB145C4226C12571A40042B29F/$FILE/06-23.pdf> viewed 4/2009.

Yu, C. C. (2007) 'A value-based strategic management process for e-government strategy planning and performance control', in: *Proceedings of the 1st International Conference on Theory and Practice of Electronic Governance (ICEGOV 2007)*, ACM Proceedings Series, Vol. 232, pp.169-178.

Yu, C. C. (2008) 'Building a Value-Centric e-Government Service Framework Based on a Business Model Perspective', M. A. Wimmer, H. J. Scholl, and E. Ferro (Eds.), *EGOV 2008, Lecture Notes in Computer Science*, Vol. 5184, pp.160-171.

Yu, E. (1999) 'Strategic Modelling for Enterprise Integration', in: *14th World Congress of International Federation of Automatic Control (IFAC'99)*, Beijing, China, pp. 127-32, Pergamon, Elsevier Science.

Yu, E. (2002) 'Agent-Oriented Modelling: Software versus the World', *Agent-Oriented Software Engineering II: Second International Workshop, AOSE 2001, Montreal, Canada, May 29, 2001: Revised Papers and Invited Contributions.*