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BUSINESS MODELS FOR EGOVERNMENT THE BMeG METHOD

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BUSINESS MODELS FOR EGOVERNMENT THE BMeG METHOD

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Abstract
So far, business models have been investigated in the context of eCommerce focusing on economic issues but they do not consider the viewpoints of authorities embarking on public private partnerships for citizen services. This paper describes our modelling method BMeG that is dedicated to the planning of business models for eGovernment services. BMeG allows one to model options of value chains with various perspectives including advantages and disadvantages with impacts on policies. BMeG depicts the added value of potential partnerships and thus supports authorities to decide on alliances for public private partnerships or other financing models for eGovernment services.

1. Introduction

Public sector information furnishes a valuable information resource for many businesses. Thus, the design of value chains across different stakeholders capitalizing on public sector information is an interesting business issue. Apart from overcoming data exchange deficiencies, the question arises of how to set-up a business collaboration between the private as well as the public sector. Our initial experience is based on a project for the dissemination of air quality information in the context of European air quality portals (APNEE [1]). Here, environmental agencies wanted to provide better services to citizens by timely delivering air quality information also on mobile phones (via SMS) to reach the citizen anywhere and anytime whenever certain emission values change for the worse. Such a service certainly targets people suffering from asthma, but could also inform the unaware general public about hazardous episodes in order to have an influence on their behaviour (e.g., they are going by bus instead of using the car due to smog warnings). The question is: should a public actor implement and operate such a kind of service alone, or might this also be an attractive business opportunity for a private stakeholder? But, how to generate tangible as well as intangible benefits and revenues for all partners in such a value chain, or in other words, how to design a sustainable business model?
Citizens and businesses ask for public services available at all times and all places. This calls for a provision of services by different access channels, i.e., Internet, mobile and fixed phone, voice server and the like („*one-stop services and seamless government*“ [2]). Such demand for innovations from public authorities (*innovation pull*) fosters the utilisation of new technologies, which in turn enables new transaction patterns between public administrations and the citizen (*technology push*). However, public coffers are almost empty. Hence, authorities hesitate to invest in solutions

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with an uncertain acceptance and impact and therefore most authorities tend to focus on the most visible mean, i.e., Internet services. But, attractive eGovernment essentially calls for push services, which notify actively about news and changes. This can be done by email, fax, but especially fast and efficient by short message services (SMS) taking into account the current spread of mobile phones in the world. Unfortunately, SMS causes additional costs compared to the Internet since the sending of messages must be reimbursed to the telecommunication provider. Moreover, such implementations are often tailored to one specific telecommunication provider and seldom shared with other departments. Cost and effort savings are therefore not generated [3]. On the other hand, commercial information service providers are searching for new content and services to improve their position in competition. Taking into account the market value of public sector information (68,5 billion Euro already in the year 2000 [4]) and the technical capabilities of commercial information service providers, public authorities should open their repositories and cooperate with the private sector, instead of acting as lone fighters and hindering the development of market-driven services [5].

Therefore, public private partnerships should be investigated in the course of planning eGovernment services [6]. Such partnerships can be conceptualised as value chains describing the roles and relationships of cooperating organisations, the exchange of goods, information and money between these partners and the main advantages for each party, which is in fact the definition of business models according to [7]. It is clear that this concept also applies to the domain of eGovernment, since public authorities are also offering products and services to citizens (G2C) and business (G2B). Once such cooperations are modelled, contributions of single stakeholders to multilateral value chains become explicit. In addition, it can be described, which services can be delegated to other partners, whether this provides benefits or disadvantages for what partners in the value chain, and what impact this could have on policies of those partners. Modelling such value chains makes it therefore possible to plan these partnerships and to select the most promising one based on an analysis according to the win-win-situation of partners.

One important point is, that for public authorities the benefits of participation in such value chains might not be purely economic, targeting financial revenues, but might serve political or legal reasons [8]. This comprises, for example, policies like “highest possible reach”, “fast information transfer”, or “compliance with rules and regulations”; in contrast to commercial policies like “increase of shareholder value” or “market penetration”. A pure concentration on monetary goals is therefore not sufficient for authorities. Unfortunately, the few existing modelling approaches of such value chains focus on commercial market players and their business relationships or internal interactions between departments of companies [9], [10].

In the following chapter we introduce our BMeG modelling method, which supports the design of different variants of value chains for eGovernment services. Section 3 covers an application example to demonstrate how BMeG can be applied, while section 4 discusses BMeG with respect to related work and research in this area. An outlook and summary finalises this paper.

2. Business models for eGovernment - BMeG

We use in this paper the term business model according to [7] as model of 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. According to this, a business model consists at least of roles, relationships, organisations, flows of goods, and benefits.

We developed the BMeG method showing how these 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 “policy” in particular pinpoints to legal regulations, the mission of an authority as well as the business policy of a company. The as-

signments of advantages and disadvantages per partner allows 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. BMeG has been validated in a number of large European application projects concerning, e.g., air quality monitoring, city governance, and emergency management.

The BMeG model

Our modelling method BMeG, *Business Models for eGovernment*, comprises a conceptual model, a modelling approach, and a specific tool specifically designed for a domain-oriented capture and presentation of the most important aspects for this special breed of offerings.

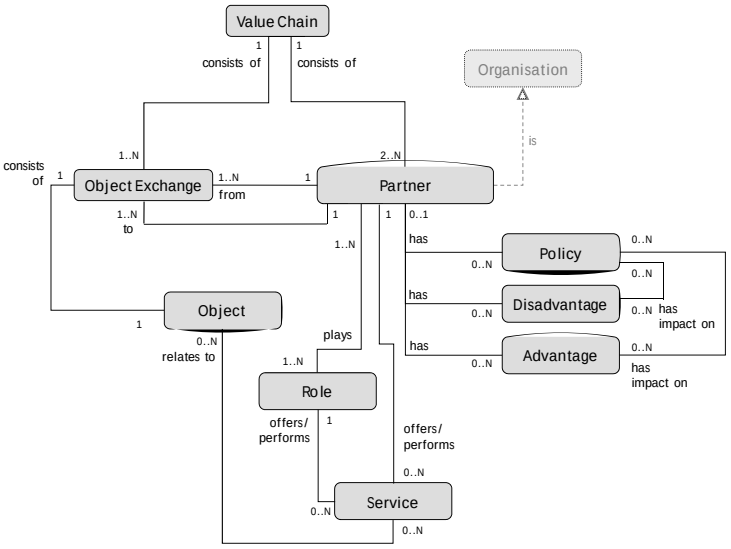

Figure 1: BMeG Model in ER Notation

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

- An eGovernment service can be operated in different variants of value chains with at least two different partners (commercial or public) and object exchanges between these partners (the end customer, the citizen, is also seen as partner). Public private partnership (PPP) partners are complementary according their tasks in such a value chain [11]. This is realised in BMeG through the concepts of *roles* and *services*.
- Each partner in a value chain has *advantages* and *disadvantages* (arguments) in its role. These arguments have respective positive or negative impacts on the *policies*[*)] of partners. By assessing the advantages and disadvantages, the service designer can predict whether a value chain can bring a *win-win-situation* to all participants, i.e., the advantages outbalance the disadvantages. Such value chains might work when implemented, while others might fail in the long term.
- Also, different possible financing options of eGovernment services (i.e., funding, sponsoring, advertisements, payment, hosting, shared operation) 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.

*) The term policies does not relate to pure governmental context, but describes in general "a high-level overall plan embracing the general goals and acceptable procedures" [12].

Even for commercial partners an exact assessment of the profit of a business could be difficult, since a participation in eGovernment projects could be also valued as strategic method for marketing or support of other business services. Therefore, no quid pro quo is required in BMeG though it can be modelled if required in specific cases.

- 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 also leads to the BMeG design rule that not each value transfer results in a return value. 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. In a nutshell, BMeG value chains consist of at least two cooperating partners exchanging at least one object of value. Each partner carries exactly one role while offering one or more services. Services can be assigned to roles or partners depending on level of detail and assignment of organisations to roles. Each partner has policies and arguments for participation, i.e., advantages and disadvantages with impact on own policies or on policies of other organisations. An object exchange is an attributed relation between two partners exchanging arbitrary value objects. These objects can be described in more detail (labels, financial values, etc.).

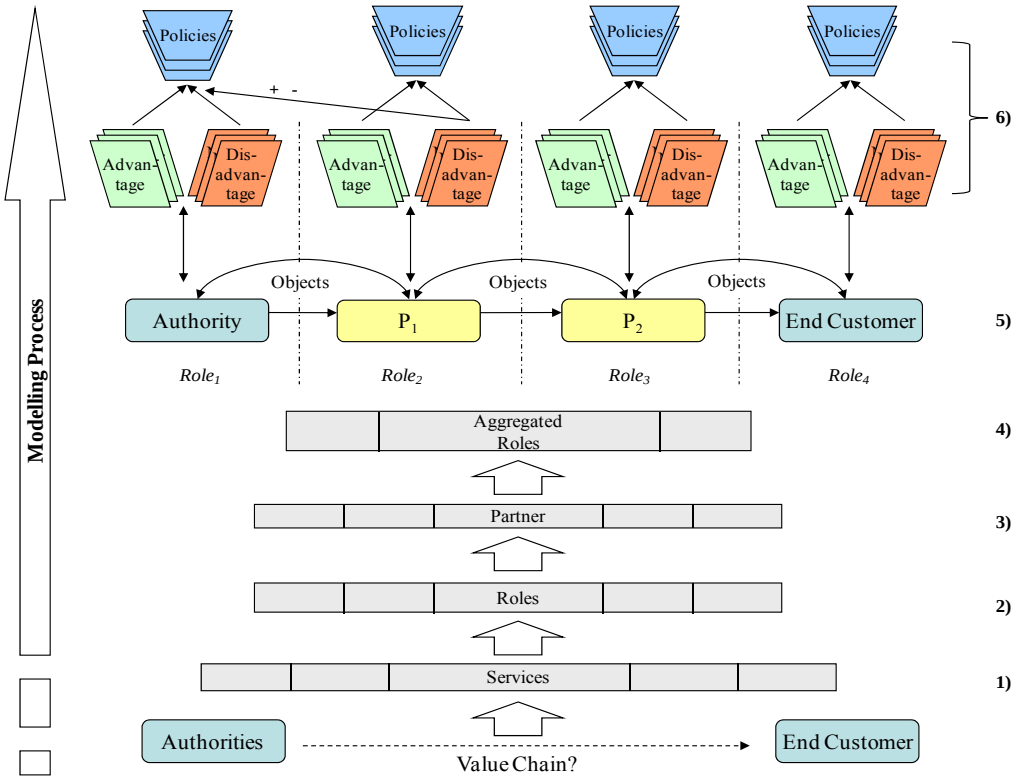

Figure 2: BMeG Modelling Approach

The *BMeG modelling approach* is defined as follows. Assume an authority plans to implement an eGovernment service. The questions arises, whether to provide the service by themselves or to take other partners on board to share efforts and risks. But which partners could have advantages to join such an endeavour? The steps to model a possible value chain with BMeG are shown in Figure 2. Pre-work should be the definition of policies of the modelling authority (might already be done in previous modelling projects).

1) Clear definition of the service, then identification and structuring of single activities that can be executed independently as services;
2) Deduction of roles offering these activities, possible merging of roles (if need be, also later supplement or further merging);
3) Negotiation with potential partners to identify possible object exchanges and financing options, and also to find out their motives and thus policies; Then, definition of organisations as possible partners;
4) Aggregation of roles according the partners selected;
5) Definition of object exchanges between these partners;
6) Definition of the advantages and disadvantages for the modelling authority, definition of partner policies and their arguments for participation. Derivation of possible cross influences (arguments of one partner have influence on policy of another partner).

By reiterating these steps different value chain options with same or different partners can be created, with equal or different financing options. Then, analysis can commence, i.e., comparison of advantages and disadvantages per partner and value chain, and an estimation whether win-win-situation can be reached in one of these options.

All these steps are not meant to be done strictly sequentially, but refinements due to further classifications are possible. Note that external investors or public funding can also be modelled by financial roles. This is especially expedient to record their funding goals and sponsoring demands.

The BMeG editor

The BMeG 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.

Figure 3 presents the BMeG Editor. The left frames show 1) project and variant trees for selection, and 2) objects stored in a database (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 orientation purposes. They show an overview image for zooming and orientation, and below a properties table for each selected node or edge in the graph panel. The central graph panel is organised in tabs, representing the variants 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.

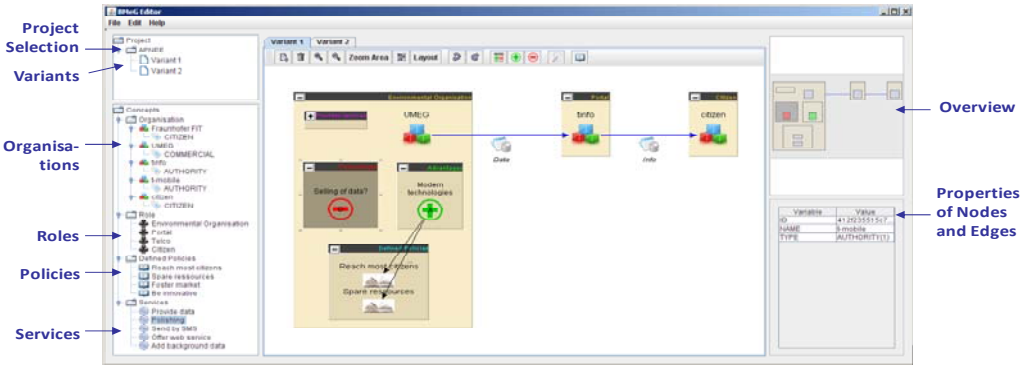

Figure 3: The BMeG Editor

The graph panel with nodes and edges serves as main modelling frame and provides graph specific functions like zooming, panning, etc. 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. The attributed icon can be arbitrarily labelled.

Assignments like “organisation has advantage” or “organisation has policy” are not represented by means of directed edges, but by placement in common folders; this saves edges and thus fosters readability and clarity of (larger) models. Also, it allows one to model the sharing of policies, advantages, and 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, which can be opened and closed depending on the current detail of interest of the modeller.
All objects can be placed freely on the panel. Moving them causes all attached folders and edges to follow their motion. Layout functions allow to re-arrange all icons according to graph layout algorithms (currently hierarchical, organic, or orthogonal layout), which prevents that the modeller gets lost in too large, complex models.

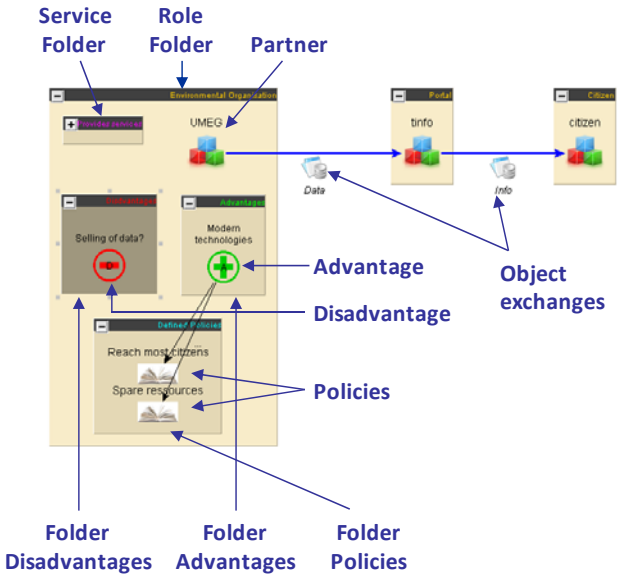

Figure 4: Modelling with the BMeG editor

As presented in figure 4, a graph panel holds the model of a variant of a value chain. It is visualised by icons (for object nodes), folders, or edges:

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	(other relationships by directed edges are also possible)
Policy	Advantages	
	Disadvantages	
	Policies	

3. Application example

The BMeG method has been initially applied in the context of the EC funded project APNEE (Air Pollution Network for Early Warning and Information Exchange in Europe) [13]. Project APNEE evaluated the potential of raising money 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 mobile phones (WAP, SMS, MMS), PDA, street panels, voice servers, and Internet. These services are operated in public private partnerships while each partnership creates dedicated value for the end user, i.e., the

citizen as customer. The following figure shows an example of such a partnership: the APNEE value chain of Germany. Partners have been UMEG (Center for Environment Measurement, Environmental Data Collection and Equipment Security), t-info (former the directory portal of German telecom), t-mobile (German mobile telecommunication provider), and the citizen as end customer.

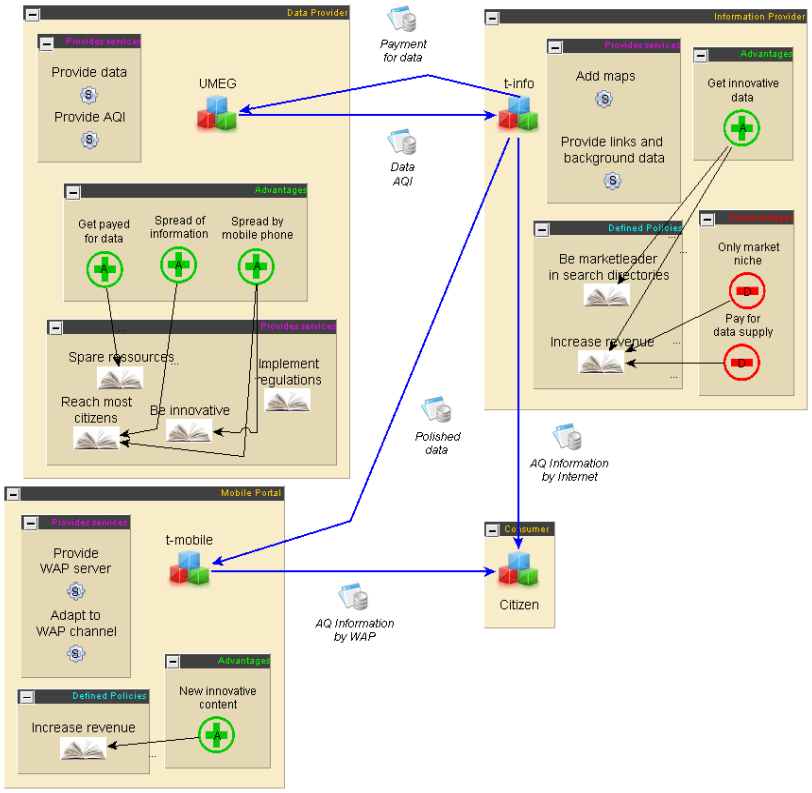

Figure 5: Application of BMeG to project APNEE-TU (example value chain in Germany)

The example in figure 5 shows the following BMeG instantiation:

- Partner UMEG as environmental authority delivers its measured and quality approved air quality data to partner t-info for further processing and final delivery to the customer – the citizen. As role specific services it has to provide the data and an air quality index (AQI). UMEG's 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, that it spares resources since it does not have to implement the service itself, and that it gets paid by t-info for data delivery.
- t-info 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 polished data to t-mobile for selling it as bundled service on their WAP portal. t-info's advantage is that they get new and qualified data for offering, but they have to pay for the data supply, and only a niche market might want to access the service via t-mobile and pay for it.

The BMeG model shows clearly, that the advantages of this value chain lied on the side of the authority, but the disadvantages on side of the commercial partner t-info. And in fact, this partnership broke, when t-info 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 over the commercial use of the data, the niche argument as well as the payment argument might have been equalized. Then, the partnership might have been survived as side service even the business policy had changed.

Project APNEE showed also that such partnerships strongly depend on local conditions [13]. This means, that value chains for eGovernment highly vary based on content, country and region, and thus cultural acceptance, market situation and more also differ. That is why the question arose of how to implement these different value chains that are "profitable" for different stakeholders while by the same time serve citizen needs.

4. Discussion

When talking about business models and value chains, business process modelling approaches emerge as possible solution for modelling and editing since business process modelling approaches are also covering the modelling of cooperations of enterprises in value chains (see, e.g., [14]). But business process modelling and business modelling serve different objectives [15]. 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 [16]. This has been broadened 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 [10]. The ontology can represent a network of actors that jointly offer a complex product or service consisting of separate products and services [19]. 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 the version presented here goes significantly beyond it. 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 is thus less emphasized than in e3value, but can be easily included when needed. Thorough financial analysis might be added to BMeG, but it is well known that the assessment of investment and fulfilment of public policies is often hard to assess [20]. e3value does not support concepts like policies, advantages and disadvantages. Differences between value chains can thus not be evaluated apart from financial flows. We argue that this is not sufficient for the decision making of authorities for public private partnerships.

The BMO (Business Model Ontology) methodology [21] 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" [9]. As in e3value, the main aim is the modelling of commercial partnerships in an extensive and detailed 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 the main concentration is on the activities. In BMeG, activities are represented by the concept of services, but their definition 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" [16]. This modelling method is used for goal modelling in the requirements engineering phase of software system development processes. Goals generally describe objectives that a software or system should achieve

through cooperation of actors in the intended software and in the environment [22]. Through this closeness to BMeG concepts, it is possible to model value chains with i*, but (i) soft goals do not represent the overall policies of authorities, whereas in our approach soft goals result from policies; (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; (iv) i* possesses entities which are not required for business models like agents, positions or links; (v) the existing tools for i* models do not show easily 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.

5. Outlook and summary

So far, eGovernment services have not been studied in a conceptual manner with policies and strategic advantages and disadvantages. BMeG strives to make such strategic alliances of private and public partners transparent in order to assess their sustainability. Public private partnership have been mostly investigated for construction and development as well as for infrastructure projects, but rarely for IT-based eGovernment services. Moreover, taking into account the revenues possible due to public sector information, such public private partnerships will provide benefits for authorities, businesses, and citizens and thus offer completely new ways of service provisions.

BMeG supports authorities and private partners to plan and select alliances by modelling variants of value chains, deriving advantages and disadvantages of partners involved, and thus assessing which partnership could be operated sustainable. Participation arguments and impacts on policies have been accented by BMeG, rather than emphasising monetary equivalences of value exchanges.

The BMeG model, methodology, and tool has been validated 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 APNEE [13], whereas BMeG 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 the Use-Me.GOV project [23]. The availability of a focussed, domain-specific solution, dedicated to eGovernment issues proved to be a key success factor in all of these case studies rather than just considering process modelling issues or purely commercial approaches. BMeG is currently applied to the case of large-scale regional emergency management in an ongoing project. Here, BMeG uncovers more tactical and strategic considerations for the provision of services while considering resource limitations.

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