KEY FACTORS IN VISUALIZING THE VALUE MODEL IN OPEN INNOVATION PROJECTS

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ABSTRACT
Collaboration in open innovation projects is a continuous process of give and take. Understanding this value exchange is important for the success of open innovation projects. Business model visualization is often used to support the communication between different partners involved. However given the dynamic, multi-direction and multi-modality of the value exchange between stakeholders, it is not known whether existing visualization methods are sufficient. In this paper we explore different visualization methods to identify the key factors that are crucial to model the business and value model of open innovation projects. We use TomTom HD traffic as the design case to demonstrate the research through design process.

INTRODUCTION
Collaboration networks have become more diverse and include more partners. An increased number of knowledge workers, plus their increased mobility, and increasing number of private ventures makes collaboration networks multi faceted. Also advanced technology developments, complexity of R&D and the leading-edge knowledge from universities and research labs adds to this diversity of the networks. Open innovation has become a logical paradigm for creating innovation (Chesbrough, 2003. Vanhaverbeke, 2006). Two important perspectives can be identified from this paradigm: the network and the stakeholder (Vanhaverbeke, 2006). The network aims to support the stakeholders to incorporate external knowledge, and to have access to external markets (Simard & West, 2006). The network gives access to complementary skills, scale benefits, and a broader knowledge base. For the stakeholders this means gaining accessible knowledge, more efficient product or service creation, shorter time to market, etc. Open innovation is therefore a dynamic and continuous event of sharing knowledge and skills to create innovative products, systems and services. As a result, the structural and operational complexity of open innovation projects is very high. It may involve a larger number of stakeholders from profit, non-profit and governmental organizations that tend to have different value systems. As open innovation is a game of give and take (Gassmann & Enkel, 2004) it is important for each party to understand what they need to contribute to and what values they receive from the complex collaboration. This also helps to create a sustainable value exchange for all parties and motivate continuous participation. To understand the value and innovation created by such a network, it is important to understand the interactions between different stakeholders. It helps to negotiate cooperation and give clarity to the sometimes intricate partner structure.

In this context, business model visualization has been widely used to improve understanding (and prevent misunderstanding) of the business model across different involved and prospective stakeholders (Gordijn, 2003). Often the focus of business model visualization is on revenue flows and cost structures, i.e., monetary exchange between stakeholders (Osterwalder, 2010). Ouden and Valkenburg (Ouden den & Valkenburg, 2010) suggest also including other types of value as what value a partner delivers to the network differs greatly and can be monetary, in physical goods, in information, in service support or in networking. Even intangible social value, e.g. improving traffic safety, can be of importance in the network. They use a value flow model to demonstrate the value exchange between different
stakeholders. This model provides a good overview of the value flow in open innovation projects.

However, there is still an underlying challenge. As mentioned, open innovation projects are often operated by a network of diverse and non-homogenous stakeholders. Stakeholders can be both suppliers and customers of the value exchanged. What adds to the complexity of open innovation projects is that the traditional model of several stakeholders offering a proposition to a user group does not apply anymore. Often the user group also participates in creating such a proposition, for instance when forming a user community that creates content for a service (Hippel von, 2001). In short, the value exchanged between stakeholders is diverse, exists in multi modalities, and takes place in multiple directions. It is therefore increasingly difficult for stakeholders to assess whether they receive equal value back for the value they deliver.

Goal of this paper is identifying the key factors in visualizing the diverse, multi-modality, multi-direction value exchanges between stakeholders in open innovation projects. A suitable visualization can support stakeholders to understand the consequences of such value exchanges on their own business models and offer extrinsic motivation to stakeholders to participate in open innovation projects. The benefits of using visualizations in product/service design have been widely recognized, for instance to communicate the complexity and intangibility of service design (Diana et al. 2009). Stanley King (King et al., 1989) suggests that visualization, as the only common language to which all participants (technical and nontechnical) can relate, is key to encouraging public participation. Visualization helps making complex concepts more tangible, readable and shareable. Maps (Tufte 1999; Ware, 2000; Morelli, 2007; Dianna, et al., 2009), flows (Shostack, 1982; Morelli, 2007), images and narratives (Manzini, 1993) have been widely used in service visualization. Our visualizations presented in this work are abstract experiments, mostly in line with the maps and flow models. Understanding the key factors in collaborative innovation by communicating them clearly in visualization can contribute to a better design of open innovation network structures and collaborations.

A research through design approach is taken because it is not yet known to what extent the existing business model and value model visualization methods are capable of dealing with these challenges. Starting with inspiration from related research and different visualization methods we executed a number of iterative design cycles of exploration – design – evaluation to discover what makes for a suitable visualization for the challenges mentioned above. We conducted a case study in which we visualized the business model of TomTom’s HD Traffic. The HD Traffic proposition is a combination of product and service with multiple diverse partners and a user base that also forms a knowledge base for the services, making it a suitable case for our research. Using the Business Model Canvas (Osterwalder and Pigneur, 2009) as a benchmark visualization to start our research helped identify aspects to include or exclude in following visualization iterations. Building on that experience we took inspiration from several other visualization methods, such as a concept map, and designed a renewed visualization. We repeated this process several times, learnt more about what it takes to visualize value models in an open innovation project in an effective manner according to the challenges identified. The challenges identified earlier were used as the evaluation criteria. At this moment in time, only qualitative self evaluation was performed. It is the ambition to extend this work and conduct more thorough evaluation in the future.

The paper is organized as follows. In the following section, the TomTom HD traffic case is introduced. Following, the visualization results using different methods and the related evaluation and reflection are discussed. Last we present our overall conclusions.
TOMTOM CASE
TomTom was founded in 1991. They have 16% share in 2010 of Europe's in-dash automotive navigation market (http://corporate.tomtom.com/keyfacts.cfm). In this paper we will use TomTom HD traffic as case to analyze the visualization of business models and to identify the factors that are required when visualizing business models in open innovation projects. The value proposition and the stakeholders of the TomTom HD traffic case are explained below. This information is based on the analysis of the data from http://www.tomtom.com/services/service.php?id=2.

Value proposition
TomTom uses several methods to improve the quality and accuracy of the maps they provide their customers, including:

*TeleAtlas Map*: a daughter cooperation of TomTom. All TomTom users drive with a SIM card in their TomTom device. From these cards TomTom extracts routing information. TeleAtlas then checks and parses this information into accurate maps.

*Map Share*: a service linked to TomTom products. TomTom customers have the possibility to input personal detailed routing information via TomTom Home. This information is immediately updated in their own system. And it is reviewed by TomTom on accuracy to use it in their global maps as well.

*IQ routes*: a service provided by TomTom using information provided by the government. The information from TomTom SIM cards, together with TMC (Traffic Message Channel) information issued by the government is used to calculate the fastest route on a specific time during the day, avoiding known traffic jams.

The HD Traffic proposition is a combination of all the above, with one added element:

*Vodafone*: a partner in the network. Next to only TomTom users’ SIM cards also the SIM cards of Vodafone customers are used to subtract routing information. This information is made anonymous by Vodafone to ensure privacy for its customers.

HD traffic is offered to the TomTom users for an extra charge of around 10 Euros per month. It is targeted at the supreme users; customers that benefit from detailed and very often updated traffic information.

Stakeholders
The main partners and resources for TomTom in this service are TeleAtlas maps (implementing the routing information in accurate maps), governments (providing TMC information), and Vodafone (giving access to travel patterns of their customers). Users are one of the stakeholders who act as information providers to support the development of TomTom HD traffic.
FIRST ITERATION

To find a suitable way to visualize the business model for open innovation projects we started by visualizing the TomTom HD traffic case in the Business Model Canvas (Osterwalder and Pigneur, 2009), as shown in Figure 1.

Figure 1 Business Model Canvas for TomTom HD traffic case

The value proposition and the key partners are already discussed in the previous section. Here we will only discuss the other building blocks in the business canvas. The customer segment of TomTom HD traffic consists of two categories. The first one is the portable navigation device users including car drivers, bike riders, smart phone users, vehicle management, and car manufacturers. The second one is the digital map users including governments, manufacturers and advertisers. These users can purchase the TomTom HD traffic service by visiting TomTom website or at the electronics shops. Through TomTom website and continuous user research, TomTom manages the relation with their customers. The users also connect with each other by sharing the real traffic information which is the content of TomTom HD traffic. Key activities including the TomTom product and HD traffic service creation, processing and distributing relevant information, and the dynamic content creation. TomTom needs to invest in content supplier contracts in order to obtain the required content, cover the design and production cost and staffing cost. In return, they receive sales from selling PND, monthly subscription fee and advertisement.

Although all the elements (partners, activities, customers, etc) are visualized in this model, the relationship and value exchange between the different partners is not present. In addition, only monetary value streams are presented. Based on this reflection we moved forward to the second design iteration.
SECOND ITERATION

This iteration is inspired by a concept map (Markham et. al, 1994). A concept map can show any number of things with their relationships to one another (Figure 2). We used this principle to show the interconnectedness of partners in multiple directions (not just in the direction of the supply chain).

![Concept Map Example](https://pkab.wordpress.com/)

Figure 2 Example of a Concept map source: https://pkab.wordpress.com/
In Figures 3 and 4 screenshots of our second design iteration are presented. The partners are grouped in the middle, surrounded by a ring that represents the product/service, again surrounded by a ring that represents the user community. When selecting an element (partner, product or community) you see the values that are passed on from that element to its direct neighbour(s). When selecting one of the now connected elements you see if and how the value stream continues to travel in the stakeholder network (not shown in the figures).

We identified several downsides to this model. First; all information about value streams is hidden in the first view which makes it unclear what this model is showing. Second; because you only follow one value stream at a time you get a very fragmented view of the value model which does not help to increase understanding of the value model. What we did find valuable was that the value exchange could be discovered in several layers or sequences; this ensures that the information is presented logically in smaller bites.
THIRD ITERATION

We have learned that the first visualization based on Business Model Canvas is not dynamic, limited to only monetary flows, and relation between stakeholders cannot be shown clearly. The second visualization is dynamic and shows the value streams between stakeholders; however it is not easy to understand. By combining the insights from the first two design iterations, we came up with a new dynamic visualization. The model is displayed below and you can also experience it interactively by clicking it.

Figure 5 Interactive dynamic visualization of third iteration

It is a multi-layered model. Starting in the “overview” tab, you can see the different elements (partners, products, services) in the value model. The legend indicates the role of the different shapes and colours. The value exchange between the different partners can be explored when navigating the partners in the “partners” tab. Viewing the value exchanges grouped by type of value, instead of partner, is possible in the “values” tab by navigating the values in the top right corner.

When reflecting, we realised that this model allows you to view the key partners, key activities, key resources, and the multi-direction and multi-modality value streams. Differentiating between modalities is done using only simple 2-D display elements, we can imagine that the information can be communicated even more meaningful venturing in a 3-D structure. Although this model is at the moment a one-off visualization specific to this case we foresee that translating this model into a tool that can be used to create unique visualizations is very feasible. Since the basic display elements have been kept simple we believe the model is suited to scale for larger stakeholder networks. The values in the business model are often passed on by several partners; e.g. money received by TomTom from the customers is partially passed on to Vodafone. As a consequence many value streams join and
intersect each other, making it difficult to untangle them to show them piecewise. We found that, in choosing which value streams to show per view or layer, it is beneficial to start with value streams from the main partner(s) for which this partner does not require a secondary partner. In subsequent views you focus on each subsequent partner until all value streams are captured in the model.

**CONCLUSION**

Through an iterative approach we developed several visualizations for the business model of an open innovation project. Based on argumentations and self evaluation we found that visualizations require a dynamic model, which shows stakeholders as both supplier and consumer and shows the different modalities of the values exchanged. By adhering to those guidelines a model is created that can be used as a discussion tool and provides a clear understanding of the project structure. Although this model is not yet formally evaluated, the characteristics of this model indicate that it is possible to use this model to support the communication between the stakeholders involved and make the collaboration more tangible. The openness of this model indicates also the dynamic nature of multi-stakeholder collaboration. We do not claim that our findings are definite as this is just a small initial exploration. However, we do think that our findings can contribute to the better understanding of the use of visualization in business modelling.

It is also interesting to mention that there are increasing initiatives to use tangible (3D) business models to support the communication of different stakeholders (Mitchell and Buur, 2010; Lu et al., 2011). We will continue this exploration and use it as a stepping stone for further research, in which the final end goal could be that the dynamic visualization can be used as a tool to support and manage collaborative innovation.

**REFERENCES**


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