BUSINESS CONCEPT MAPPING

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Abstract. Concept Maps are ideally suited for business-level conceptual modeling. Actual experiences from a number of business client projects support the claim. Business people readily accept Concept Mapping. Furthermore, the flexibility and agility of Concept Mapping support creative business development activities, which in business literature are described as "Design Thinking". The parallels between Design Thinking and Ausubel's Meaningful Learning approach are presented. Concept Mapping should be considered a Business Analysis activity related to business development projects.

1   Introduction

Concept Maps (Novak 1990, 2008; Novak & Cañas 2006; Moon, Hoffman, Novak & Cañas 2011) are finding their way into business environments. This paper outlines experiences from 15 business client projects since 2005. The author has personally conducted all of them. In addition a consulting firm, the author frequently works with (having 40+ consultants), is now using Concept Maps on all business analysis projects (going back to 2007).

Concept Mapping is well suited for business analysis, by design. The theory of Concept Maps is based on D. Ausubel's work on Meaningful Learning (Novak 2008). Learning is based on representational and combinatorial processes, which occur when you receive information. New concepts are related to relevant, existing concepts in an existing cognitive structure (in a non-verbal representation). In other words, there are two processes: Discovery (of information) which (through successful integrative reconciliation (Novak 2008) leads to reception of the information - integrated with what the learner already knows.

Using IHMC's CmapTools (http://cmap.ihmc.us) software the concept mapping is performed in a brainstorming manner in teams of 5-10 business experts. This works well together with a new approach to business development called "Design Thinking" (cf. for example: Brown 2008, Martin 2009, Liedtka & Ogilvie 2011).

2   Concept Mapping in the Business Context

Concept Maps may be used on different levels of abstraction:
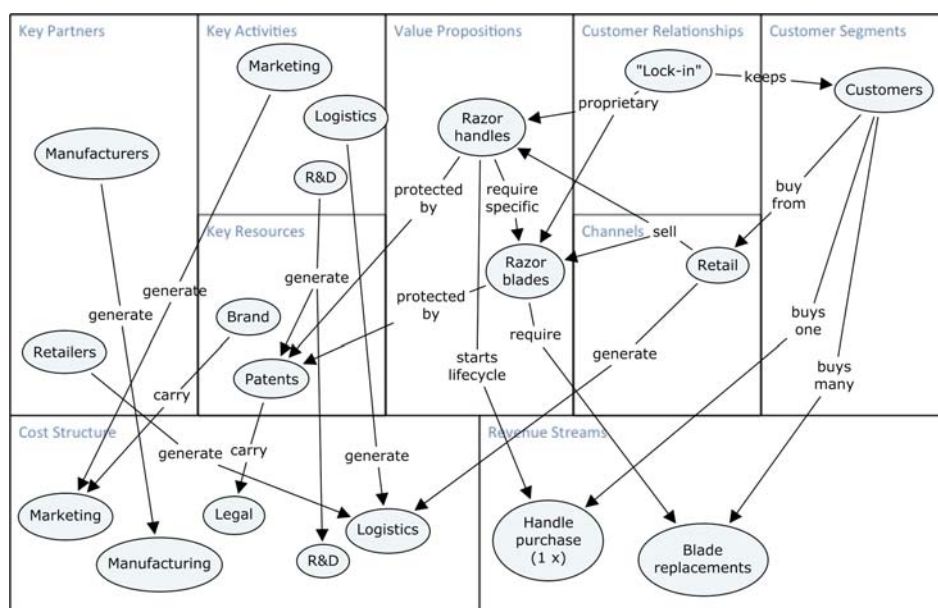
From: Business Model Generation by Alex Osterwalder and Yves Pigneur, Wiley, 2010

Figure 1 – The Gilette Business Model on a Business Model Generation Canvas

The (pedagogical) example above visualizes the famous Gilette business model (the authors interpretation thereof) layered on top of the Business Model Generation Canvas (Osterwalder & Pigneur 2010). The Business Model is a good starting point for a top-down approach and it can be broken down into more detailed (subject area oriented) Concept Maps. The focus question for each Concept Map will relate to the depiction of the selected subject area (typically a major business process).

Space does not permit many examples, so here is an example of a very detailed level of Concept Mapping (a slightly generalized client example of a design of a dimension in a business intelligence application):
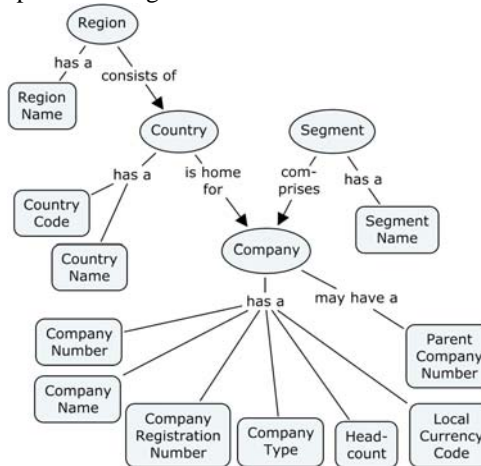

Figure 2 - Generalized Company Dimension

As can be seen from the example, what is used is a simple, loosely defined, visual meta-model with the following elements: "Business Objects" (things of the business world) are circles, properties of business objects are rectangles with rounded corners, one-to-many relationships may be illustrated using arrowheads, properties are normally related to their business object without arrows. All relations should be named using the relevant business terminology. Some times actual data values (eg. "Denmark" for Country) may be included (for pedagogical reasons) using rectangles with sharp corners. Concepts, which are defined in another Concept Map, are shown using a dashed contour. This (deliberately) simple visual syntax works very well among the business people. It supports an agile approach with speed, expressiveness and ease of use as the major characteristics. Our approach at times use advance organization (by the author) of high-level business concepts. But most of the time a team Concept Mapping approach is used. Describing the business concepts is a task for business people.

3   Design Thinking Business Analysis

As described above, Concept Maps work very well in business contexts and they support a very creative and results-oriented approach to business development. This is often referred to - in business management literature - as "Design Thinking" (cf. for example Brown 2008, Roger 2009, Liedtka & Ogilvie 2011).

Business people operate in very dynamic situations and need very flexible approaches. And business people are people, who understand and use different, possibly slightly conflicting contexts, most of the time. The business concepts and their relationships, which together form the structure of the information asset on the business level, are at the core of business modeling and planning. Most people acknowledge that the key concepts of the business are important. However, they are assumed to be readily available in well-defined ways. That assumption is a big mistake. The challenge is that in order to change something, you must understand it.

Over the last few years more and more business people (cf. for example Brown, 2008) have taken notice of the idea of "Design Thinking" as an approach to business development. Not only products but also services, the organization, the business models, the narratives and all the rest of business management should be designed, not engineered. A February 2010 report (Aminoff, Hänninen, Kämäräinen & Loiske 2010) quotes A. G. Lafley, CEO of Proctor and Gamble, for this: "Business schools tend to focus on inductive thinking (based on directly observable facts) and deductive thinking (logic and analysis, typically based on past evidence). Design schools emphasize abductive thinking - imagining what could be possible".

Within the Design Thinking movement there is a lot of talk about "Wicked Problems": "Whereas managers avoid working on wicked problems because their source of status comes from elsewhere, designers embrace

these problems as a challenge" (Martin, 2009). The cognitive aspects of Design Thinking include inductive, deductive, and abductive reasoning (Martin 2006). In Martin's view, MBA programs provide students with both inductive and deductive reasoning, but underemphasize abductive reasoning, which is as the process of forming an explanatory hypothesis. The dividing line is not between synthesis and analysis, but between "reliability" and "validity" (Martin, 2009). Reliability is the traditional business management approach. On the other side of the house, designers are rewarded for validity. Producing things that really are valid (on the market, in the organization, among the customers, employees etc.). It is the validity angle, which is in focus in Design Thinking. Validity is demonstrable using Concept Maps and is a requirement for innovation.

Design Thinking is a series of processes. At the top you have the "Mysteries" - the wicked problems; where you do not readily understand, what you see (Martin, 2009). Then a two-step series of events is applied: (1) Turn "mysteries" into heuristics (rules of thumb); this enables you to get ideas and to prototype solutions, which you can test, improve, test again and so forth, and (2) turn heuristics into algorithms (precisely defined programs and procedures), which can run your business and generate the reliability, which stakeholders are interested in.

4   Concept Mapping in the Design Thinking Context

The process of discovery and the subsequent understanding is one of the skills designers have (Martin 2009). This is in parallel to Meaningful Learning (Novak 2008).

Our experiences show that the process of developing Concept Maps in brainstorming sessions is highly supportive of creating understanding of different angles and perspectives. The A-Ha's are bound to appear sooner than later. The starting point is validity driven thinking.

In Tim Brown's approach (Brown 2008) he defines some groups of activities in the flow of design:

- **Inspiration**, which among other things contains the sharing of insights, storytelling, organization of information and synthesis of possibilities (more stories). Concept Maps have proven (in our experience) to be excellent storytellers on the business level.
- **Ideation**, which among other things involves making sketches, scenarios, more storytelling and internal communication. Again, Concept Maps have been used in most of our projects for all of this.
- **Implementation**, where concept maps (we have found) are very good for documentation, communication and instruction on the business levels.

To explore the "mysteries" you develop a set of Concept Maps, which are re-iterated over a period of time. They can describe as-is and also "wannabe future" concepts and structures. Prototype solutions are also mapped conceptually until the business people arrive at a working prototype, which they decide to go along with. The final solution must have a conceptual design, of course, and you may also add various detailed documentation or instructional Concept Maps to explain things to the business users.

In the inspiration phase it might have been discovered that there are areas, which need to be reworked. It can be e.g. missing concepts and relationships, concept "repair and restoration" work (redefinition and/or restructure), opportunities for doing things better than before, opportunities to learn from the A-Ha's, and opportunities for producing new designs (of new or existing things). Concept Maps give you the knowledge about these opportunities in non-complicated ways – enabling the full participation of business people.

5   Summary

Based on experiences from 15+ client projects since 2005 (and ongoing), we have strong confirmation of the applicability of Concept Mapping for Business Analysis. Most of the projects have been data warehouse / business intelligence oriented business development projects. A few of the other projects were large specification projects in the public sector. The projects were actual business development projects and were not performed in a research context. However, we have positive confirmation from our experiences of:

- Concept Maps are intuitively easy to understand for business people, which greatly simplifies and facilities more agile business analysis activities.
- Concept Maps are well suited for collective brainstorming sessions (workshops) where the Concept Maps are being drawn (on a computer connected to a data projector) as the discussion goes on.

- Concept Maps can be reviewed, maintained and enhanced by business people (with some guidance).

A simple visual "syntax" involving "Business Objects", "Properties" and "Relationships" has proven to be very effective in communication information structure to business people. Client feedback has been overwhelmingly positive. The business users quickly recognize the added value of Concept Maps.

The ideation phase is the most important. It is here that business value is created as the team exploits what it learned about the enterprise in the exploration phase. The design thinking approach helps the business people and the analyst to transform the business and lays the foundation for building new and better conceptual solutions. The team is able to force creativity to the surface, when its level of understanding is sufficient.

Using Design Thinking to perform business development and change requires understanding where you are today. Concept Maps were designed and developed by Prof. Joseph Novak (1990, 2008) with a learning focus. The theory behind Concept Maps is based on D. Ausubel's work on Meaningful Learning (see Novak 2008 for a good overview). Learning is based on representational and combinatorial processes, which occur when you receive information. New concepts are related to relevant, existing concepts in an existing cognitive structure (in a non-verbal representation). In other words, there are two processes: Discovery (of information) that (through subsumption) leads to reception of the information - integrated with what the learner already knows. In this manner Concept Mapping is not only facilitating learning, but also creativity. Notice the parallels to the Inspiration-Ideation-Implementation in (Brown 2008) as well as to Roger Martins flow (Martin 2009).

5.1 Further opportunities

Novak (2008) links the integrative reasoning and super ordinate learning effects of meaningful learning with creativity. Our practical experiences seem to confirm that. Further research could investigate to what extent meaningful learning is part of creativity and which other synergic mechanisms exist between and across meaningful learning, abductive reasoning and creativity.

This paper is based on work done in preparation of a book to be published in 2012 (Working Title: Design Thinking Business Analysis - Business Concept Mapping Applied (Frisendal TBP)).

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