Developing Knowledge from Big Data through the Cloud

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Abstract

The business environment has an increasing amount of data that can both identify new opportunities for business firms while at the same time providing knowledge on ways it can carry on its business. The data in this environment comes from many sources and is commonly referred to as big data. The paper describes ways that firms can utilize this data quickly to increase their competitive advantage by directing data to where it adds most value. Many firms see information technology as the driver of this process. This paper takes an alternate approach in defining ways to integrate big data into everyday business planning activities. It sees design thinking as a way that people can collaborate to search big data effectively and to implement the model using cloud technology. It describes how building blocks can be used for this purpose and proposes a set of building blocks to support this process. Rather seeing big data from an information technology perspective the paper sees big data activities being integrated into the business activities in ways that support business processes.

Keywords

Collaboration, Wicked Problems, Business Innovation, Design Thinking, Building Blocks, Big data

1. Introduction

This paper describes ways that knowledge, which arising in big data environments, can be integrated with business processes to where it has most value to a firm. We distinguish here between the terms organization and firm. A firm is a business unit with a particular purpose and financial accountability. An organization (Gulati, 2013) is a collection of units, which may come from different firms, working towards some common vision. This has an impact on big data as in the later any discoveries may need to be quickly shared between different firms. An organization can thus be a number of firms working together towards some emerging goal. Each firm has its own management structure.

Firms and organizations engage in activities. Activities such as industrial design as for example apparel are continually monitoring this big data environment to determine trends in the environment and its impact on the continual evolution of their strategy. Knowledge in big data includes trends in preferences, new evolving technologies and preferences of different customer segments. Firms are now looking at ways to harness this data and derive knowledge from it to add value to their business – so are business networks. Big data means many things to different people. Perhaps the broadest distinction is size and complexity. This paper focuses on the complex nature of big data and ways to make sense of it.

2. Design Thinking and Business Building Blocks

Design thinking (Martin, 2010) is an emerging human centered approach to problem solving where knowledge workers combine knowledge from many sources and utilize their knowledge to create solutions for stakeholders. Design thinking encourages deep engagement of stakeholders through visualizations that create new insights, and which in turn leads to innovative solutions. Design thinking is increasingly seen as a way to approach large scale problems in business strategy (Camillus, 2008, Doz, 2010, Head, 2013). Design thinking has another advantages – it itself is complex in nature and matches the theory that to deal with complexity you yourself needed to be complex – so that you can devise the right states to match what arises in the complex environment.

The predominant design approach today is an analytical approach characterized by what is often known as the waterfall cycle. In the waterfall method the product is delivered at the end of the project. In this case all the

decisions and trade-offs are made at the beginning. The increasingly changing environment leads to another approach. Systems are now more dynamic, continually change and adapt to their environment and to other systems. The agile alternative is to develop the system as a set of releases starting with the minimal viable product. Then as we learn from each release we develop the next release. In agile development this happens throughout the whole development process. A version of service is introduced; we learn from it and then make additional trade-off given a new set of choices to be made. The first step in design thinking is often called the Minimal Viable Product (MVP). Here there is minimal change to set a direction and generate some early value. Once the initial step begins to show promise then it is further developed. A solution thus emerges gradually as developers learn from early versions. Each step requires further ideas. This may arise as users discuss what they have learned from earlier steps and make suggestions on what to do at the next step. Not all decisions are made at the start – they are continuous.

Design thinking (Martin, 2009) has been attracting considerable attention as a way to develop business systems through continuous evolution. Its major contribution to design (Johansson-Skoldberg, 2013) has been its focus on innovation through collaboration. This paper proposes design thinking together with business building blocks as a way to design business systems in complex environments. We link big data to design thinking through directing knowledge to building blocks. The predominant idea behind design thinking is illustrated in Figure 1

The advantage of using design thinking is that it does not constrain designers to a definite specific formulation or specification of the problem; on the other hand it encourages innovative approaches at all stages of design. There are just general goals such as increased sales in a new market, or increasing tourism in some region. Innovation is thus encouraged as stakeholders can continually contribute to the solution as they learn from earlier designs. Solutions are not true or false, but better or worse, there is no test of whether a solution will work as any solution can result in unpredictable behaviours of users and stakeholders. It is stakeholders who get together to contribute ideas acceptable to all following discussion. The environment here is one of increased social networking where many issues are resolved by collaborative engagements between stakeholders where trade-offs are made in the light of deep engagements intended to arrive at mutually acceptable solutions rather than a predefined solution.

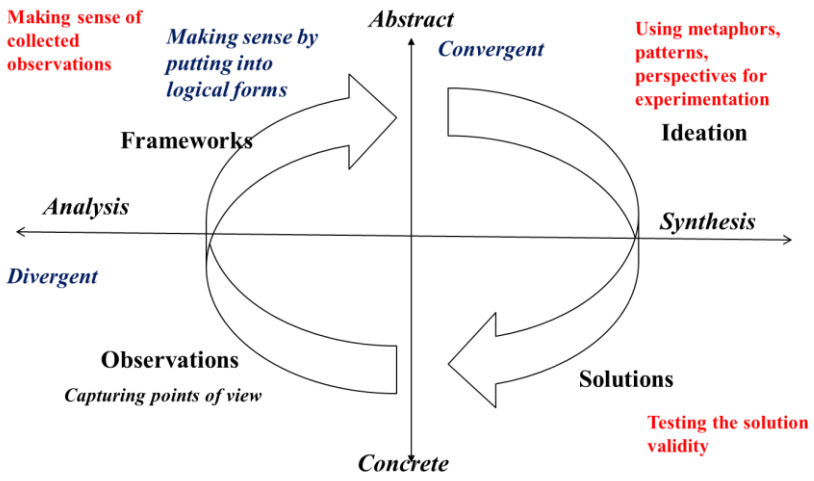

Figure 1 – The basis of design thinking

This paper combines design thinking with business building blocks, in the way shown in Figure 2. It builds on Martin's idea that complex systems are a mystery that is explored through the capture of stories from stakeholders. These stories are then combined to provide solutions. In a large system there may be many stories that are captured. The paper proposes building blocks as a way to organize stories. Stories are captured into building blocks and selected stories are combined into solutions.

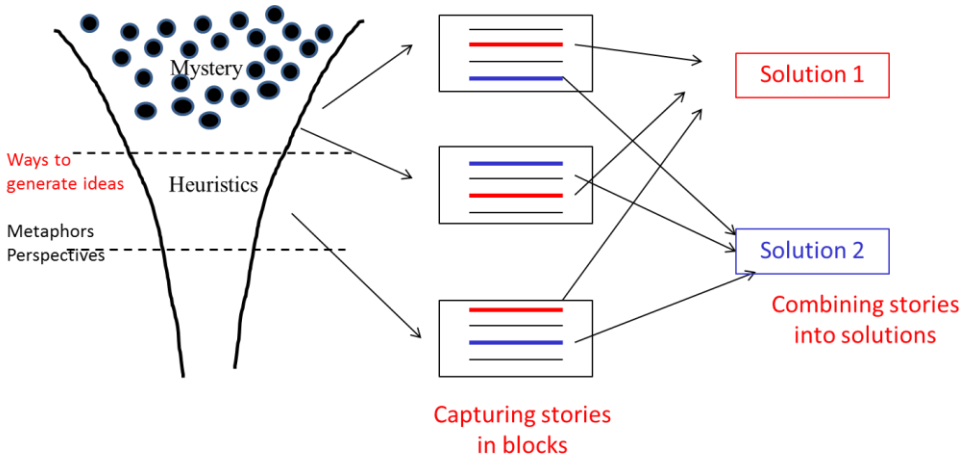

Figure 2 – The idea behind design thinking

Building blocks must be chosen to provide a framework or what can be sees as a conceptual model of the way the business will work. In this case the issue may be on how to integrate big data activities with business vision through collaboration. The building blocks provide the framework for collaboration to achieve this goal. Associated in the notion of a canvas where all stories captured are presented together for collaborators to make decisions that take all points of view into account. Stories and ideas are collected in the business blocks and put together to create solutions where big data provides maximum benefit to business activities.

3. Choosing Knowledge Building Blocks

Building blocks are increasingly seen as a way to design business models in complex environments. These environments are characterized by continuing change and require design methods that create processes that can respond to this change. There is no standard set of building blocks. The most widely known building blocks for business are those proposed by Osterwalder (2010). Others include Sinfield (2012) and Johnson (2008) defines four classes of building blocks, namely:

- Customer value preposition,
- Key resources – people, technology, information, channels, partnerships and brand.
- Profit formula – revenue model, cost structure, resource velocity and margin model,
- Key processes – processes, rules and metrics and norms.

The building blocks are generic in nature as for example, market partners and key activities. Stories are collected about the building blocks and ideas and solutions created through a combination of these stories. Thus in Figure 4 the stories against the building blocks suggest a possible model where we find partners in different regions but look for partners that focus on sales of shoes. A number of such proposals can then be evaluated and a choice made. Figure 3 shows an example of three building blocks – market, partners and key activities. Some stories are listed next to each building block. These stories are an example based on a garment manufacturing firm make choices of what to make and where to sell it.

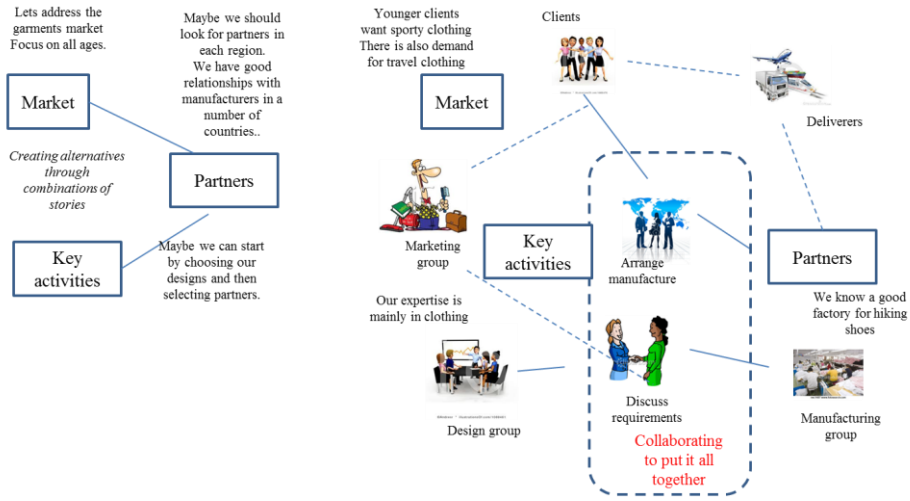

Figure 3 – The idea behind building blocks

The building blocks shown in Figure 3 are similar to those proposed by Osterwalder. We propose a set of building blocks that make sense of big data in an environment of design thinking. The goal here is to integrate activities in big data analysis with business activities.

4. Extending to Big Data Environments

As shown in Figure 4 we are integrating big data with design thinking processes in the organization. The model shows our organization immersed in a big data where elements of big data are collected

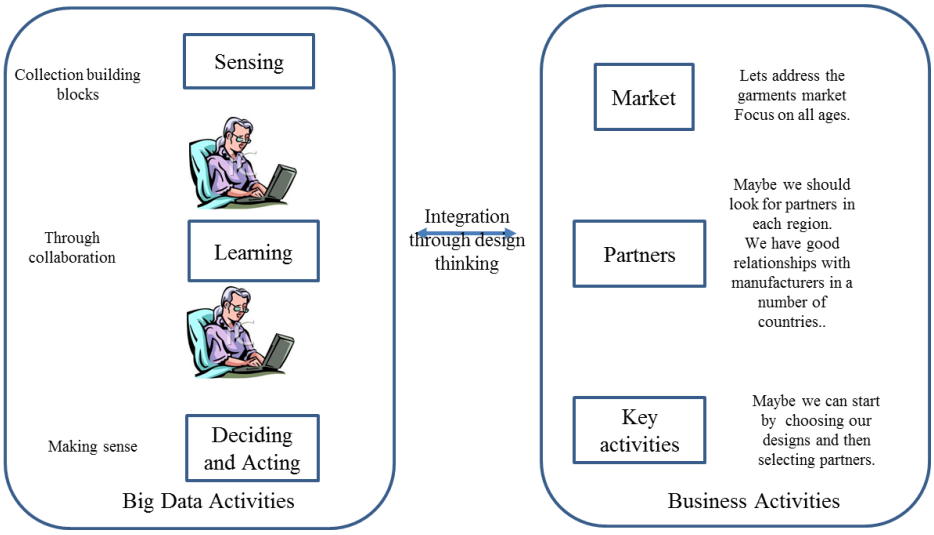

Figure 4 – Building blocks for linking big data and business

Earlier paper described modelling knowledge sharing to support business to business networks. Here specific roles were designated to deal with specific. Now stories of what is happening in our key activities are brought together on the one canvas.

Creating a canvas for linking

Design thinking uses the ideas of a canvas to provide all the information to collaborators for decision making. Postit notes are often used as a canvas for this purpose. One way to manage the information is through a canvas like that shown in Table 1. Table 1 can be seen as a canvas that brings together big data activities with what is found in the market and our partners. In practice the number of stories is much larger – often post-it notes are used, with different colors of post-it note for different building block. Table 1 is only an example; in practice there will be a large number of stories for each building block.

Sensing	Learning	Deciding	Market	Partners	Key activities
Young people are looking for bright colored clothing Fashion trends of seniors	Can you make sense of the conflicting trends? Is what people want much different to what we produce now? Do trends differ between countries	Maybe we should change our design company to focus on new products. Should we focus on selected countries?	Maybe we should be focusing more on seniors Seniors are an increasing market Do we know how to get information on what seniors like	We have distributors in many Asian countries We need partners who can find out what people in these countries prefer	Finding the best manufacturers of products. Finding retailers and distributors in different countries.

Table 1 – Documenting stories

Thus as discussion proceeds stories in different building blocks are brought together. For example an observation that seniors are becoming an increasing market segment can indicate that more work need to be done to search for senior's fashion trends. This of course is a simple illustration – in practice there would be numerous stories in each building block indicating more in depth relationships.

5. Providing Services for Design Thinking through the Cloud

Building blocks like those described in Figure 4 need to access a wide of variety of data services. Keeping track of stakeholder stories is itself a large task especially when it includes following up ideas through discussion. Figure 5 illustrates a tool known as INNODESIGNSPACE to maintain stories developed in the cloud. Here any number of building blocks can be defined and stories posted on them. In Figure 5 there are three building blocks – our values, community values, and what can we do together. Stories can be captured from all participants or stakeholders in Ideas and visualizations can be added as we learn through discussion and experimentation of what solutions are acceptable to stakeholders.

The software also includes a ways to capture solutions through selecting stories from different building blocks and developing a model for discussion with designers.

6. Conclusion and Future Work

This paper described an innovative way of combining design thinks and business building blocks to capture knowledge needed in the design of agile business processes. It then described software that can be used to capture knowledge in the building blocks. This software provides services to support design thinking process. Future work rests on developing active building blocks to capture data from external sources and what the most effective canvasses are for integrating big data with business activities – or in fact making them a part of business activities.

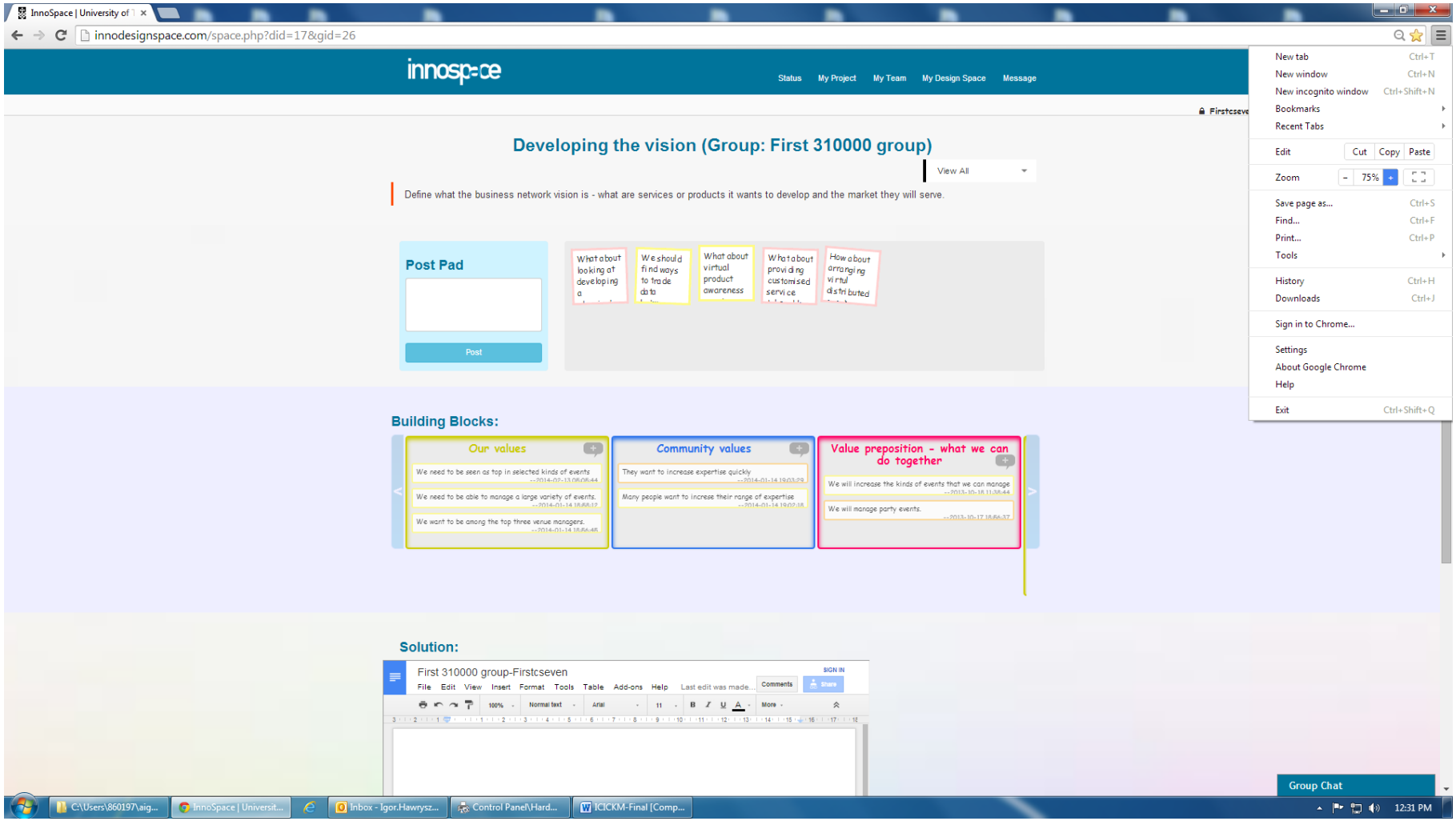

Figure 5 - A CANVAS or design space on a computer

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