Creating Design Spaces for Business Model Innovation

I.T. Hawryszkiewycz
University of Technology, Sydney
igorh@it.uts.edu.au

Abstract

The increasingly complex environments require information systems that can adapt to the continuous unexpected change that characterizes complex systems. This in turn calls for new design methods that cater for emergent requirements as stakeholders continually learn as the system evolves. Any new design methods must focus on continually adapting a system to changes in its environment rather than reaching a well-defined goal. The term agile development is often used to describe such methods. Agile development is increasing in practice but does not have a theoretical basis. In this paper we examine the practice in an attempt to provide a framework for agile development. The paper suggests a three pillar framework – a design process that focuses on innovation, design thinking as generic cognitive support and business building blocks to provide cognitive support. The paper then describes how to organize design spaces and a computer support method.

Keywords

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

Introduction

The paper describes a framework for developing methodologies to address the increasingly complex business and social systems. Currently no widely accepted methodology exists for this purpose but three methods currently in the literature and in practice are increasingly used independently for this purpose. This paper describes a framework shows how these methods can be combined to provide guidelines for agile information systems development. The framework addresses new business and social systems that exhibit traits, which are the hallmarks of what scientists call complex systems. A complex system in this paper is seen as composed of many parts that interact with and adapt to each other and, in so doing, affect each other's behavior in unpredictable ways. These systems are prone to unexpected, large-scale, seemingly uncontrollable behaviors. The combined system-level behavior arises from the interactions of parts that are, in turn, influenced by the overall state of the system. Terms such as wicked systems are increasingly used to define the emerging environment as is the description of information systems as complex adaptive systems. Typical phenomena in complex information systems have been identified earlier (Merali, 2006); these are the emergence of macro-level structures due to interactions at the micro-level (self-organisation). Complex systems evolve from bottom-up rather than top-down, calling for rearrangement of responsibilities, and restructuring of relationships.

Correspondingly information system development needs a new approach to address increasing complexity. Information systems need to be designed more as complex adaptive systems rather than systems that realize prespecified goals through a reductionist approach. This evolution in design can be seen as natural from a trend that began with automating existing processes (often through structured systems analysis), through supporting well defined ways of new operating methods (such as
web based online sales) to the now emerging environment where there is a need to create systems that deal with unanticipated events. The three pillar framework proposed in this paper for developing methodologies to address these systems:

- Cognitive processes for continuous innovation. Design thinking is now emerging as an approach to designing business systems in the emerging complex environments.
- A management process that facilitates the cognitive processes continuous development of systems
- A set of concepts based on business building blocks that address the goals. These need to be interdisciplinary in nature.

The paper focuses on design thinking (Martin, 2009), agile development and business building blocks (Osterwalder, 2010) and ways that they can be combined into a methodology to design business processes. The paper describes generally applicable building blocks used in practice and ways to organize them into a systematic design process. It describes how building blocks provide a visualization that encourages new ideas to emerge through collaboration and interaction between stakeholders. The building blocks provide semantics natural to business models that include stakeholder value, partners, value prepositions, costs and revenues, key requirements and markets. It then provides ways to out these together in innovative ways to create a business process. The paper diagrammatic tools and concepts that provide ways for models to emerge as change is considered. The paper first describes the three pillars and then a way to combine them.

**Pillar 1 - Martin’s view of Design Thinking and its emphasis on innovation**

Design thinking (Martin, 2009, Brown, 2008) is used here to provide a focus and principles for innovation focused design. Martin’s method is shown in Figure 1, one of seeing the complex environment as a mystery. The mystery is reduced to a solution through heuristics. The emphasis in design thinking is on collaboration to develop solutions through continuous innovation as stakeholders add and change features and through learning and continuing collaboration continuously improve the systems. This paper focuses on one aspect of design thinking – the visualizations that lead to collaborative teams gaining innovative insights.

![Figure 1 – Design thinking - Martin](image)

Important characteristics of design thinking are that:

- All stakeholders are involved at each stage, and
• Design thinking is a continuous process, not just one off. Often a design process is followed to release a new system we learn from it and then continue with the next release.
• Visualization is deemed important as a way of generating alternatives.

The heuristics here are unspecified and need to match the problem at hand. This is the equivalent of notes posted on post-it boards but now a formal way can be introduced through suggestions of the heuristics used to reveal the mystery. These can be metaphors, questions to ask or perspectives and models such as business building blocks as models. One example of using perspectives as an approach (Yoo, et.al.) focused on knowledge, social structure, organization and business process in a government setting.

**Pillar 2 – A Process change from Analytical to Adaptive**

The predominant design approach 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. The increasingly changing environment leads to another requirement. Systems are more dynamic, continually change and adapt to their environment and to other systems. The difference is illustrated in Figure 2. In the waterfall method we define and deliver the whole system. In this case all the decisions and trade-offs are made at the beginning. In the agile alternative the system is developed as a set of releases starting with the minimal viable product (MVP). Here there is minimal change to set a direction and generate some early value. Then as we learn from each release we develop the next release. In agile development this happens throughout the 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.

There is thus continuous evolution. Each step requires further ideas. This is consistent with design thinking where we can use heuristics to facilitate the generation of ideas. Each new release calls for new ideas, possible new experimentation. These 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.

![Figure 2 – Comparing development approached](image-url)

The focus on any implementation is on encouraging collaboration between all stakeholders involved in a system. A common way is to use post-it notes to paste comment on building blocks on a board. Different methods are used to identify building blocks – either by the location on the board or by different colors used for each building block. The important requirement of an implementation is a canvas, or design space, to record discussions, ideas and people’s comments on them. A board with post-it notes as shown in Figure 3 is a canvas or what is called in this paper, a design space. The emphasis here is on experimentation through bringing the tacit knowledge of stakeholders to jointly propose mutually acceptable solutions. Methods used to do this are typically postit notes on visible boards where stakeholders can post and discuss ideas as they emerge. This is consistent with the
complex adaptive systems. In summary the emphasis is on holistic approaches, including stories arise from different perspectives. In this case post-it notes can represent different domains.

![Figure 3 – A board with post-it notes as a canvas](image)

Currently the processes in most environments are ad-hoc with stories emerging based on stakeholder’s experiences and not in any formal way. The result can be that not all possibilities are examined given the lack of a framework on which questions can be based. Martin’s design thinking provides a way to introduce these in a formal way.

The post-it notes in our framework correspond to business building blocks. In most cases the post-it notes are of different colors. In terms of our framework each color represents a different building block. The notes are posted as discussion between stakeholders takes place between stakeholders. Our next step is to show the correspondence of such discussions to an agile development process.

**The Stanford Innovation Process**

The most popular process that combines agility and innovation is the Stanford process shown in Figure 4. It stresses a collaborative approach to design (Hung, 2013) that places considerable importance on engaging people to work directly to resolve problems in their context. Its goal is to encourage research experimentation both in technical support as well as business models. It goes beyond open systems methodologies as it emphasizes collaboration of multi-functional teams and support for such collaboration. The major emphasis here is to start by defining stakeholder values, their points of view and use this to create solutions that satisfy all stakeholders.
Design thinking addresses two important differences between the design thinking approach for complex problems and traditional methods are:

- The new systems place greater emphasis on values perceived by stakeholders with explicit measures taking secondary importance to price. People may be prepared to pay more at a restaurant because they like the atmosphere.
- There is more emphasis on business model innovation rather than re-engineering.

This is consistent with design thinking, as illustrated by the bold components in Figure 4. It emphasizes visualization as is the case with perspectives in design thinking and experimentation in testing and learning. The perspectives and heuristics are also consistent with the ideation and other steps in the process shown in Figure 4. What we now need are the concepts to develop the model of any proposed system.

An important part of designing thinking process is the canvas and presentations or visualizations to foster experimentation and collaboration. All the information collected is presented on a canvas. The canvas is a presentation of the current state of thinking about the problem, people’s points of view, suggested solutions and comments on these. The important factor is that to reach a holistic solution requires collaboration and a continuous evolution on the canvas on the current state of thought.

**PILLAR 3 – The Domain Focus**

In this paper we focus on building blocks here are seen as visualizations that enable experimentation in business models. Building blocks have been increasingly used as a way to describe business systems and provide a framework for focusing social engagement to a business outcome. They are consistent with design thinking as building blocks encourage deep engagement of stakeholders through visualizations in a general sense that create new insights, which lead to innovative solutions. It is increasingly seen as a way to approach large scale problems in business strategy (Camillus, 2008, Doz, 2010, Head, 2013).

**Business Building Blocks**

Building blocks are consistent with design thinking and agile development as they do not constrain designers to a definite specific formulation or specification of the problem; on the other hand they encourage innovative approaches at all stages of the agile process like that shown in Figure 4. 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 behaviors 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.

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 5 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 (Sinfield, 2012).

![Figure 5 – The idea behind building blocks](image)

There is no standard set of building blocks. They have been described by their type or purpose. For example Johnson (2010) proposes that the choice often depends on the business focus, which can be customer, cost, product or resource. Others propose customer value preposition, key resources, process and profit. It is up to the developers to choose the building blocks most appropriate to their business. The most widely used system of building blocks at least at the strategic business layer is that of Osterwalder (2010) shown in figure 6.

![Figure 6 – A canvas based on Osterwalder's business model framework](image)

Building blocks support experimentation on business models. Stakeholders record their points of view and suggestions against the building block and then collaborate at examining the business possibilities provided by different combinations.
**Pillar Integration - Satisfying the Theory**

For complex adaptive systems the argument is that you can quickly create a new building block to address an unexpected input. In developing a unified theory we draw on two approaches:

- Design thinking and its experimental and collaborative nature,
- Complex adaptive processes. The trend is to a different cognitive process that is used in current waterfall methodologies.

A formal diagram of the cognitive process and the way it integrates the components of our framework is shown in Figure 7.

![Figure 7 – Design thinking and building blocks](image)

Here the agile development process is mapped onto the cognitive framework. Emphasizing and observation is captured as stories, which in turn are organized into building blocks. These building blocks are combined into through discussion into solutions that are then evaluated.

**Providing a Canvas for the Framework**

What should design spaces or canvases look like? Literature suggests that design spaces be organized as a combination of models, questions and narratives, and visualizations where stakeholders can focus on a problem with a solution emerging as a model while bringing their tacit knowledge to suggest innovative developments in the model. This calls for social software that is customized to supporting these social activities within the context of design thinking. The system combines the social interactions that characterize design thinking with the organization of building blocks into levels. We have used two methods here – the templates and are now experimenting with software. An example of a template is shown in Table 1 and has been successfully used with students. Each column here corresponds to a building block. The column stories marked with asterisk illustrate potential solutions. We have also developed social software to support the framework. A more detailed description including application to large problems can be found in Hawryszkiewycz (2013).
<table>
<thead>
<tr>
<th>Our value aspirations, competitiveness</th>
<th>Community or client values</th>
<th>What are the kind of things we can do together (a vision that realizes all values)</th>
<th>Market – the value that your new system will provide</th>
<th>Key requirements</th>
<th>Systems involved (partnership)</th>
<th>Challenges (what is outside your control)</th>
<th>What are the success measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generate more shopping activity in shopping center ****</td>
<td>Get easy access to items I want to buy *****</td>
<td>Provide a wider range of shopping services within easy reach of each other *****</td>
<td>Local community will get more shopping variety *****</td>
<td>There will be services that attract people to come and stay at the center</td>
<td>Current tenants ****</td>
<td>Getting approval to extend center size</td>
<td>Increased revenue for center tenants</td>
</tr>
<tr>
<td>Make the center a community rather than a shopping center. *</td>
<td>Do all my shopping activities in one trip *****</td>
<td>A place where citizens can easily access services in their everyday life</td>
<td>Attract more customers beyond local community *</td>
<td>The community will have easy access to the center *****</td>
<td>Working with local council to develop the center</td>
<td>Growth of nearby centers *****</td>
<td>New businesses applying for space</td>
</tr>
<tr>
<td>Increase interest in center beyond local community *</td>
<td>Minimize my shopping time *****</td>
<td>There are things to do by visitors other than shopping</td>
<td>Sporting associations to assist with arranging sporting activities</td>
<td>It will be easy for customers to move through the center to reduce customer shopping time *****</td>
<td>Construction companies to improve paths</td>
<td>Increased number of shoppers *****</td>
<td></td>
</tr>
</tbody>
</table>

**Table 1 – A Template for Building blocks**

**Potential Software tools**

A support tool for the cognitive process is shown in Figure 8. Here building blocks are at the center. The canvas illustrates the space is to define a vision for a delivery business. The building blocks include stakeholders, stakeholder values and a value proposition acceptable to all. These are reached through discussions between stakeholders in the context of what is recorded in the design space. The Post it for team members to post ideas and team members can enter new solutions and evaluate them. The software should provide a canvas through its interface that supports the design thinking activities. It shows a canvas consistent with Figure 7 where:

- The building blocks are shown as repositories of stories collected through discussions or through a chatbox. Here the is a building block for stakeholder values, key requirements as well as others,
- There is a post pad for ideas,
- Solutions or proposals can be posted with sketches, and
- Solutions can be evaluated and compared.

The canvas is visible to all designers who at any time can post their contribution to the design.

Here the software supports a number of teams who work on the design spaces created by the coordinator. This design space or canvas is composed of a number of business blocks defined by the coordinator. Members of the team can:

- enter stories in any of the design blocks,
- enter comments on each other’s stories,
- come up with ideas and comment on the ideas,
- enter proposed business model based on the idea and using stories in the building block to put the idea into practice,
- draw a sketch of the proposal.
Figure 8 - A CANVAS or design space on a computer
Summary and future work

The paper identified the lack of a theory or framework for agile methodologies although a number of directions currently exist in the literature. These are design thinking, agile processes and business building blocks. It then showed how they can be combined into a framework for creating design methodologies in the emerging complex environment. It proposed that methodologies be based on three pillars – the way of thinking that encourages innovation, a process that builds this thinking into generating outcomes, and a set of generic concepts that can be used in experimentation with alternate designs. It illustrated this approach by using design thinking integrated into agile development processes combined with building blocks to develop business models in emerging complex environments. It described design thinking as meeting the need for greater social engagement to support collaboration needed to address complex problems, while at the same time providing a structure to organize such engagement. The paper then focused on defining the cognitive process that characterizes design thinking and supporting this process with collaborative software.

One important extension is to organize building blocks for large scale problems. Often more than one design space is needed in the increasingly complex characterized by a larger meta organization (Gulati, 2013) and must interact with other businesses in that meta organization. Examples of complex problems include:

- New systems for smart cities (Macomber, 2013) including providing ways of living in increasingly larger and growing cities while conserving energy needs and providing services to citizens. These may include new business systems such as safety, energy use or increasing green areas. All these need to be put together with other systems to create a smart city.
- Global supply chains including logistics systems in the delivery of materials including food supply, especially in underdeveloped regions (Cozzolino, 2011).
- Ways to support energy, food and water security (Tellis, 2008, Richter, 2013) that is now emerging as an issue in emerging economies.
- Manufacturing processes (Leitao, 2013)

The large number of building blocks in such large scale systems cannot be accommodated in one canvas. Our future work is to provide and integrate canvases that address separate problems in large scale systems to provide holistic solutions. One way here is to:

- Support a vision level that focuses on main strategic issues and main strategic key requirements.
- The next canvas or set of canvases identify the missions – or what must be done to realize the key requirements, and partners you may work with. The difference between key requirements and mission is important. The key requirements are what the enterprise wants to happen; the mission is how to make it happen, in particular what key activities we must develop to realize the mission.
- The next level can be the projects needed to accomplish missions.

References


Merali, Y., 2006. “Complexity and Information Systems: the emergent domain” *Journal of Information Technology* Vol. 21, No. 4,


