Leveraging uncertainty: a practical approach to the integration of responsible innovation through design thinking

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Abstract

This paper presents the results of a study conducted with several major actors from the French financial industry, which aimed at developing a process for developing responsible innovations by deploying a design thinking method. We begin by presenting the context for the study which includes a brief description of our approach for understanding and exploring the issues raised by responsible innovation in a practical context. Secondly, the design thinking method is introduced as a potentially suitable approach for addressing wicked problems and thus, the integration of responsible innovation. The paper will conclude with a presentation of the process for developing responsible products and services which was developed throughout the study. The main purpose of the paper is thus to demonstrate that integrating responsibility in innovation does not have to become a constraint if it is incorporated as a tool for stimulating the creative capacity of innovation teams.

Keywords: Responsible innovation; Uncertainty; Wicked problems; Design thinking.

Introduction

Today’s leaders face a multi-faceted set of challenges characterized by the uncertainty and complexity of an ever-changing environment. It thus comes as little surprise that uncertainty as a characteristic of innovation has been an increasingly popular topic among innovation research scholars over the past decades (eg. March & Simon 1958; Allen 1977; Galbraith 1977; Hofstede 1980, 2001; Hurst 1982; Shane 1995; Moore 1999; Adam et al. 2000; Beckman et al. 2004; Johnson 2007; Chemarin et al. 2011; Glick 2012; Allen 2013; Olson et al. 2014), notably in terms of management approaches aimed at leveraging that uncertainty to achieve performance objectives despite the prevailing risk factor (Che 2010; Meier 2014; Parayre 2014). The late twentieth and early twenty-first centuries are partly characterized by the exponential growth of technological advances, illustrating Moore’s law through a driving force of technological and social change, productivity and economic growth (Keyes 2006; Liddle 2006). In fact,
many scholars have focused on technological innovations to illustrate the consequences of their inherent uncertainty (Blok and Lemmens 2014). However, this uncertainty is not exclusive to technological innovations, but rather applies to all profitable implementation of new ideas and their corresponding process. The action of progressing through the latter can be described as muddling through (Rehn and Lindahl 2011), where each step is taken into the unknown (Hurst 1982). Indeed, any innovation process, by definition, requires action to be taken under conditions of uncertainty (Jalonen 2012). While it can be argued that the emergence of responsibility as a critical component of innovation has many origins, its operational integration stems principally from the raised awareness surrounding the new challenges and unforeseen consequences of new technologies and technological systems (Hellström 2003). However, the application of responsible innovation in an operational context concerns all sectors, whether new technologies are involved or not. As soon as there is innovation, unknown impacts arise, thereby calling responsibility into question (Pavie 2012). However, this responsibility must not hinder the creative capacity and performance of the innovation process. Rather, an effective responsible innovation process management should be oriented towards the translation of responsibility as a lever of creativity used to steer the innovation through a responsible path of development with regards to its impacts on social, economic and environmental factors (Pavie et al.2014; Pavie and Carthy 2014).

This paper explores the operational application of a responsible innovation process through the deployment of a design thinking methodology. In order to ensure the adequacy of the process, the specificities of responsible innovation need to be analyzed with a view to finding the most suitable method for addressing these characteristics. As responsible innovation essentially aims to address uncertainty and potential impacts involving many stakeholders, some research has hinted at its ‘wickedness’ (Blok and Lemmens 2014) in terms of the complexity and interrelation of the issues at stake. A design thinking approach will thus be introduced as the method used for addressing this wickedness by stimulating the creative capacity of teams, aiming for performance of the innovation process. The study presented in this paper resulted from a project initiated in 2011 in response to a need expressed by several French financial institutions in search of an operational process for integrating RI. The aim of the project was to develop an effective tool to assist organizations in the development of responsible products and services. The methodology was largely based on a design thinking approach and involved the creation of a ‘co-opetitive’ working group made up of multi-disciplinary actors.

1. Context

1.1. An emerging concept for addressing the sustainable performance of organizations

The concept of innovation has been subject to many attempts of definition since the late 1880s, however none have been as influential as Schumpeter’s work from the first half of the 20th century when he coined the term ‘creative destruction’ (Schumpeter 1942). He highlighted the ultimate objective of innovation as a means of facing competition and creating a monopoly to address a specific need (Schumpeter 1954). According to the Austrian-American economist, innovation consists of any of the following phenomena: (1) introduction of a new good; (2) introduction of a new method of production; (3) opening of a new market; (4) conquest of a new source of supply of raw materials or half-manufactured goods; and (5) implementation of a new form of organization (Schumpeter 1912:66). By referring to the ‘élan vital’ in his 1907 book ‘Creative Evolution’, French philosopher Henri Bergson was already hinting at a creative urge inherent in life which defines the direction of evolution. This impulse forms the basis of the desire to innovate: an inherent desire to the entrepreneurial spirit, as defined by Schumpeter (Pavie 2012).

Innovation is thus widely accepted as a process that is fraught with uncertainty (Jalonen 2012). This uncertainty concerns both the innovation development process and the post-launch phase. As described by Geoffrey Moore (1999), crossing the chasm which separates the early adopters from the early majority of customers is a defining step for a new product or service to become an innovation. Once this has been completed, all processes will be affected in order to keep up with the increased demand and impacts are thus impossible to predict prior to the launch. Jalonen (2012) identified eight factors of uncertainty: technological uncertainty, market uncertainty, regulatory/institutional
uncertainty, social/political uncertainty, acceptance/legitimacy uncertainty, managerial uncertainty, timing uncertainty, consequence uncertainty. Up until now, policy attempts have been made to address this uncertainty by implementing the precautionary principle or the sustainable development theory. However, these are highly unsuitable in an innovation context, characterized by its competitive environment and emerging previously unknown issues. Indeed, the precautionary principle can dangerously stifle creativity and innovation while the sustainable development theory is outdated. Thus, while the former is hardly compatible with an innovation’s economic performance objective, the latter does not address the arising issues and development of our current society. Böhle (2011) underlines that it is important to recognize and accept uncertainty while at the same time maintain the ability to act. Innovation thus requires a specific coating of responsibility to ensure its primary goal to create value is not hindered. Responsible innovation therefore aims to address the intrinsic uncertainty of innovation, while maintaining the ability to act.

1.2. The ‘wickedness’ of responsible innovation

It is important to dissociate responsible innovation from the concept of ‘responsible research and innovation’ (or RRI, a central theme in the context of the Horizon 2020 European program). Indeed, applying responsibility to a research context will raise issues different to the ones faced in the context of innovation. In fact, while research impetus is generally characterized by its epistemic significance, the goal of innovation is to create value for the organization in a competitive context, with the ultimate objective of releasing and commercializing a finished product.

Three axes contribute to a better identification and understanding of the issues raised by responsible innovation (Pavie 2012, Pavie et al. 2014). Firstly, the questioning of the solutions to develop in response to individual needs suggests adopting a slightly more philosophical approach to business in general and more precisely to the answer of certain consumer needs. Secondly, the monitoring of the direct impacts of innovation on the consumer requires the effective management of the innovation throughout the entire lifecycle to ensure that any negative impacts on the consumer are identified and corrective action is taken accordingly. Thirdly, the consideration of the indirect impacts of the innovation on the surrounding social, economic and environmental factors aims at guaranteeing that the ecosystem as a whole is taken into account in the impact analysis.

Responsible innovation thus consists in the development of new products and services combining growth, performance and responsibility. This responsibility is directed at clients and users as well as the ecosystem as a whole. At each step of its iterative process initiated at the idea phase right through to market withdrawal, the innovation is analyzed rigorously and methodically to evaluate consequences and risks which the new offer could generate. As such, responsible innovation may be considered an evolution or modernization of the sustainable development theory, since it incorporates the issues emerging within the socio-economic and political landscape of the 21st century.

The theories and issues linked to the sustainable development concept are generally associated with the characteristics attributed to wicked problems (Norton 2005, Raffaello et al. 2010, Brundiers – Wiek 2010). First introduced by Rittel and Weber in 1973, wicked problems were used to describe untamed problems which are difficult to pin down, highly complex systems in which cause and effect relations are uncertain and unknown. Part of the reason for the complexity of wicked problems is linked to the multitude of stakeholders with diverging motives who are involved in solving these problems. Due to their differing backgrounds, perspectives and motivations, their individual interpretation of the problem varies greatly (Kreuter et al. 2004).

With its intrinsic uncertainty and operational complexity, responsible innovation management can thus be described as a wicked problem. Indeed, its characteristics correspond to those introduced by Rittel and Weber (1973), notably the lack of a definite, one-fits-all management solution for the integration of responsible innovation and the fact that every responsible innovation development is essentially unique as arising issues will depend on the type of organization involved, the sector it operates in, corporate culture, etc.
It becomes clear that, in the same way that addressing wicked problems involves mobilizing various actors, forms of knowledge and practices, so does responsible innovation management. The latter therefore needs to focus on the integration of responsibility, which aims to address uncertainty, as a lever of creativity throughout the innovation process.

1.4. Design thinking: definition, general scope and benefits for innovation

Design thinking is a strategy based on user-centric design methods and principles which first appeared in the 1980s and was developed and made popular by David Kelley and Tim Brown over the late 1990s (Kelley–Littman 2001). In fact, the widely used definition of design thinking was suggested by Brown: “a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity” (Brown 2008).

Design thinking is incorporated into the innovation process in order to develop specific solutions to address complex issues. The current revival of interest for this creative discipline is justified by its effective method for creating concrete solutions to address organizations’ new needs and requirements in terms of innovation. Design thinking’s pioneering approach appears to be particularly effective and relevant in terms of solving wicked problems, especially in terms of addressing the operational integration of responsible innovation by leveraging the uncertainty that surrounds innovation. Indeed, design thinking represents a unique combination of scientific and technical rigor; an understanding of the needs of human beings and society in general; a clear consideration for the economic imperatives of an organization and also provides a basis for monitoring the environmental impact of a project.

Design thinking has many benefits, including its ability to articulate itself around and adapt to the organization’s innovation process. There are five main objectives to this method, including the opening up of the innovation process to include customers, stakeholders and experts capable of providing guidance with regards to potential impacts; the improved understanding of customer needs and expectations, by involving these throughout the process; the full use and management of new distribution channels through the cross-disciplinary work; the reduction of risks posed by innovations by making an impact monitoring system central to the innovation process and the redefined role of organizations as actors actively shaping the future of society.

2. Methodology

2.1. Design thinking method for developing responsible innovations

Design thinking has been proved in the past to be an effective tool for solving wicked problems (Zimmerman et al. 2010, Nelson 1994, Coyne 2005), for which, as mentioned earlier, there is no simple or straightforward method of solution (Rittel–Webber 1973). As discussed earlier, the practical integration of responsible innovation in organizations represents a wicked problem.

Design thinking tackles wicked problems through a three-pronged approach: desirability (human needs); viability (business needs) and feasibility (technical needs) (Brown 2008). The first point is concerned with putting the users and stakeholders at the center of development, by assessing whether the solution is genuinely useful and therefore shows empathy towards users by optimizing ease of use. The second point addresses the business requirements for developing a specific solution, in terms of adequate resources and know-how as well as previsions on profitability and return on investment. The third point deals with the technical needs of the solution, in other words: can we implement the solution rapidly? Is it easy to maintain? Is it consistent with regards to our current situation?

Traditionally associated with the downstream innovation process of products and services and considered to simply provide an attractive packaging for the client thereby providing limited results in terms of value creation, design thinking has now become an integral part of the innovation process. Indeed, it plays a strategic role in value creation through the creation of ideas that better answer the expectations and needs of consumers. Design thinking methods vary from one organization to another and can be adapted accordingly to suit specific sectors. The method
used in this project was made up of the following five stages: understand; co-create; design; co-evaluate and develop and consisted of the following elements:

- The creation of a multidisciplinary group in order to generate a global vision of the problem at hand, which involves the use of responsibility as a lever of creativity to guarantee the efficiency of the innovation process of organizations (focusing on the financial sector, while bearing in mind the need to keep the process adaptable and applicable to other sectors) without stifling the creative capacity of teams. The working group consisted of philosophers, academics, anthropologists, designers, banking and insurance professionals as well as end users.

- The separation of the theoretical and practical dimensions of responsible innovation to ensure that each part was treated accordingly and simultaneously. As such, the theoretical approach consisted in an analysis of existing research surveys and a literature review to conduct a debate surrounding the topic of innovation and philosophy, while the practical approach, in parallel, consisted in conducting a series of ethnological interviews with regular bank and insurance customers and industry specialists, to assess their views on financial institutions, the industry as a whole and the role of innovation and responsibility within that sector.

- Following the background work and on the basis of resulting syntheses, four workshops were organized to process, exchange and debate surrounding the information and with regards to the issues raised:
  - Workshop 1 was dedicated to the exact formulation and wording of the issues being treated as well as the definition of the parameter to which the responsible innovation method would be applicable. This facilitated the development of the first draft for the responsible innovation process.
  - Workshop 2 was dedicated to the research of new service concepts which would be deemed responsible. This workshop was essentially centered on the final user and resulted in the development of twelve different concepts.
  - Workshop 3 was dedicated to the analysis of the concepts developed in the previous workshop by confronting them to the first draft of the responsible innovation process derived from Workshop 1. This session allowed both the refinement of the process (creation of a responsible innovation process including the evaluation of impacts according to social, economic and environmental criteria) and the further development of the service concepts. Three concepts were then selected as those that were considered most likely to be developed into real responsible services.
  - Workshop 4 consisted in testing the three service concepts by evaluating them in terms of responsible innovation, through the responsible innovation process and its impact analysis based on the social, economic and environmental criteria. This final workshop also enabled the finalization of the responsible innovation process, as potential practical drawbacks were identified throughout the analysis of the service concepts.

2.2. Design thinking’s contribution to the practical implementation of responsible innovation

The main objective set at the beginning of the project was to design a method capable of supporting the development of responsible innovations in the banking and insurance sector while taking into account social, economic and environmental impacts linked to the new product or service. The design thinking method aimed to provide a process for assessing an innovation in the light of the three axes of responsible innovation and the principle of responsibility, as well as to identify potential innovative and responsible products and services. The design thinking method facilitated the merging of the necessary theoretical and practical approaches to address responsible innovation as a wicked problem.

Figure 1 illustrates the simultaneous approaches of the theoretical and practical elements of the method. On the one hand, academics addressed the issue of defining responsible innovation and how the responsibility of an innovation might be measured in order to feed that information into the analysis of the innovation process based on the three axes of responsible innovation. They also worked on developing the existing sustainable development criteria to provide an updated set of factors to be evaluated. In parallel, anthropologists conducted surveys with both financial sector professionals and customers to examine their interpretation of responsibility and how an innovation could become responsible from their perspective. The results of both approaches were then analyzed conjointly in order to create a process for the assessment of an innovation in light of the concept of responsibility and the identification of potential innovative and responsible products and services.
3. Results

As illustrated in Figure 2, a classic five-step innovation process was used as the basis for the participants to position the three axes of responsible innovation at different stages of the process to highlight where each question should be addressed. As such, it was agreed that the axis concerned with questioning whether to answer a particular need should be addressed in terms of its philosophical and ethical value as early as possible, i.e. at the ‘Idea’ phase. This axis should also be linked to the other two axes in order to determine whether or not to answer a need based on the direct and/or indirect impacts being generated by the innovation. The two remaining axes concerned with direct and indirect impacts were positioned throughout the whole process, thereby representing the need to question all impacts at all stages of the lifecycle of the innovation. In order to address the uncertainty of innovation and its impacts, an iterative system of hypotheses was suggested as a way of evaluating potential risk factors. These hypotheses should be formulated throughout the initial development phases in order to be tested once the innovation has been launched.
Each stage of the process was then attributed a sub-title to further define the purpose of that particular phase in the development of the innovation. As such, the idea phase was labeled as the stage where ‘philosophical issues’ should be addressed in order to establish whether or not to answer a consumer need. An initial evaluation of potential social, economic and environmental impacts also takes place as the first set of risk hypotheses are created. The feasibility phase was labeled as the stage where the analysis of potential social, economic and environmental impacts should serve as ‘guidelines’ to steer the further development of the project in the right direction. The capability stage was labeled ‘norms’ in order to include a verification of the latter with regards to social, economic and environmental impacts. Furthermore, this phase should include a specification of the risk hypotheses as the project is becoming more defined. Additional hypotheses may also need to be added while others may no longer be relevant at that stage. The post-launch stage was labeled ‘measures’ to ensure that the risk hypotheses are tested and verified once the project has been launched, thereby facilitating an increased control over the lifecycle as a whole. The results obtained from testing the risk hypotheses should support management in their decision to recall or not a product if negative impacts are deemed too harmful with regards to social, economic, environmental factors or indeed on the consumers themselves.

It was agreed during the workshops that the impact criteria should be separated into two categories: impacts on the user (direct) and impacts on the ecosystem as a whole (indirect) through the inclusion of social, economic and environmental factors. Figure 3 features examples of such direct impacts (eg. client health) and indirect impacts on social (eg. impacts on HR development), economic (eg. impacts on employment level) and environmental factors (eg. ecological footprint). While direct impacts are focused on the user in terms of his or her physical and mental
health, behavior as a citizen and/or a consumer, indirect impacts concern the social, economic and environmental factors linked to the innovation. It is important to note that the list of criteria to be tested is non-exhaustive. Priority should be given to the criteria which are particularly relevant to the sector which the organization operates in. The social, economic and environmental factor criteria most relevant to the financial industry were selected and placed by the participants of the study at different phases of the innovation process. Hypotheses are an integrated part of the process as they are used to represent impacts which cannot be accurately measured prior to the launch phases. These are formulated and specified throughout the development phases to be tested once the product has been launched (post-launch).

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<th>PHILosophical Issues</th>
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<th>4. LAUNCH</th>
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<td>Adaptability for the</td>
<td>Level of security for users, personnel and nearby residents; Impacts on HR development; Impacts health (prevention, screening, treatment); Service adaptability; Degree of service reliability and efficiency; Transparency towards clients regarding risk; data and transaction security; Impact on competition level; Economic and territorial development; Profit vs. Firm Attractivity</td>
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<td>disabled sick; Access to service without discrimination; Contribution to social dialogue; Responsible Communication, transparency; Contribution to fight against exclusion/discrimination; Solidarity; Fundamental rights for all; Impact on client health</td>
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<td>Enforcement to other responsible activities; Apply principles of risk precaution/prevention; Solidarity economy; Impacts on commercial balance, employment level and wealth distribution</td>
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<td>Ecological footprint; Impacts on the diversity of habitats, individual behaviour in terms of respect of environment; treatment of pollution; Considering existing alternatives, does this project guarantee the continuity of energy resources?; Impact on individual behaviour regarding respect of the environment and environmental health</td>
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It was therefore agreed that a responsible innovation process should be iterative and include a combination of these direct and indirect impacts. Its iterative structure should facilitate a swift reintegration of the project into a previous development phase in order to address particular issues arising throughout the process with regards to design and responsibility criteria. The design thinking method helps to combine the need for creativity with the monitoring of impacts; uncertainty is thus leveraged as responsibility becomes a lever of creativity for developing better innovations which are at the service of citizens and not the other way around. One of the main objectives of the responsible innovation process is to guarantee that the creativity of the multidisciplinary team is unleashed fully, thereby ensuring that the need for responsibility does not stifle the process for generating ideas. In that regard,
design thinking can gear the brainstorming session and the reflection of individuals toward answering a particular consumer need, while considering the various responsibility criteria.

Conclusion

Innovation is, by definition, fraught with uncertainty. While measures such as the precautionary principle or the sustainable development theory were introduced to tackle risk arising from uncertainty, such regulations pose a risk to innovation. By nature, innovation requires a certain amount of freedom and risk-taking. The precautionary principle does not take into account the economic imperative of innovation. Similarly, the sustainable development theory is outdated and does not provide precise guidelines for driving innovation through the uncertainty. Responsible innovation aims at addressing the uncertainty throughout the process without hindering the performance of the innovation through responsibility. However, with its intrinsic uncertainty and operational complexity, responsible innovation management can be described as a wicked problem.

A pioneering approach based on user-centric design methods, design thinking represents a unique combination of scientific and technical rigor to address complex problems such as the operational integration of responsibility throughout the innovation process. Throughout the project, design thinking was used as a method for leveraging uncertainty and responsibility issues surrounding the innovation project into creative opportunities. Thus, the project team was continually steered in the direction which addressed both responsibility and performance imperatives. The results also revealed that the responsible innovation process needs to be adapted to the sector and company at hand. This adaptation phase is an integral part of the design thinking method, allowing the multi-disciplinary team to define the specific conditions for the uncertainty in their specific sector.

The RI process developed throughout the project translates the need for responsibility – which arises in the context of uncertainty – into operational criteria which form an integral part of the innovation’s development. Through its three-pronged approach, design thinking proved to be an effective tool for developing responsible products and services which focus on the balance between human needs, business needs and technical needs, linked with the corresponding responsibility issues. The RI process also ensures a monitoring of the innovation’s lifecycle as a whole, thereby guaranteeing accountability for any impacts which should arise post-launch. It is important to highlight that the RI methodology presented in this paper is designed to be used complementarily to the organization’s existing or ‘classic’ innovation process. Though it was developed in the context of the finance sector, it is also perfectly adaptable to other sectors and organizational structures.

References


