Innovation by Design:
Using Design Thinking to Support SMEs

Julian Paul Malins
Professor of Design, The Robert Gordon University, Aberdeen, Director of the Centre for Design & Innovation (c4di), Aberdeen
j.malins@rgu.ac.uk

Abstract

Small to medium sized enterprises (SMEs) are generally clear on the need for innovation; however they are very often less clear on how innovation can be brought about. One possible reason for this may be because of a lack of an innovation culture within their business. Global giants such as Google and Apple are companies with highly evolved innovation cultures that the average SME may have difficulty in relating to. Developing appropriate tools for SMEs to allow them to develop their own innovation cultures is a core activity for the Centre for Design & Innovation (c4di). This paper describes how SMEs have been assisted through the application of design thinking to develop their own innovation cultures through a programme of workshops and one to one support. This paper strives to look beyond the rhetoric behind design thinking to critically evaluate the techniques and approaches that have proved to be of particular value when working with companies.

Introduction

Many SMEs whilst acknowledging the importance of innovation do not necessarily have an innovation strategy. One reason for this is the difficulty in gaining an impartial external perspective that can inform the SME of its strengths and potential areas of development for the future. In 2008, c4di (www.c4di.org.uk) was established in Aberdeen, Scotland. The centre aims to assist SMEs by working with them to establish an innovation strategy. The centre has developed a series of workshops and resources designed to provide SMEs with clear insights into how they might bring about an innovation culture that is appropriate for their organization. The programme is based on a constructivist experiential approach to learning. Exercises have been developed that involve hands-on participation and include a playful series of activities that are designed to encourage a shift in perspective whilst promoting collaborative design thinking. The programme covers a range of design methods from ethnographic observation to rapid prototyping. The general approach is based on serious play. This involves using the extended metaphor of games and activities designed to give people permission to think without the usual inhibitions that tend to suppress creative thinking. The wider aim is to develop projects with SMEs that can lead to new product or service innovations.

In Don Norman's recent article 'Design Thinking: A Useful Myth' (2010) his description of design thinking as a myth promoted by design consultants or which in reality is just another way of describing creative thinking, is typically provocative.

However, whilst agreeing with the view that creative thinking is an inherent characteristic of all human beings and not just a skill possessed only by designers or other creative individuals, the c4di tea are applying an approach which is derived from the world of design. Design thinking must include creative thinking by individuals and involves collaboration, often between multidisciplinary groups leading to problem identification and problem solving. It is not restricted to designers whose training may predispose them to being able to tolerate higher levels of ambiguity, which is a particular attribute that tends to support lateral thinking (De Bono, 1967). The term design thinking provides convenient shorthand to describe an ethnographic approach to gaining insights into human needs that can trigger important innovations generally in the form of incremental as opposed to transformational. c4di's approach to helping SMEs was to look particularly at innovation models based on a standard design process. This process includes the following key steps:

- Understanding

- Observation

- Ideation

- Prototyping

- Synthesis

- Iteration

- Implementation

The following paper looks at how these steps in the design process have helped inform an innovation learning strategy.

Understanding

Understanding at what stage an organization is at, in terms of its readiness to innovate is essential if the company is to benefit from any form of support or intervention from an external organization. Ian Davis (2010), Managing Director Emeritus of McKinsey & Company, speaking on the NESTA website on the global challenges facing the UK economy in the next decade, makes a number of useful observations about the nature of innovation. He identifies three main categories of innovation that are; innovation of products and services, innovation of manufacturing processes and innovation of the business model itself. He also alludes briefly to innovation within the culture of the business. He suggests that for most organizations focusing on efficiency may be more appropriate, and that most organizations should only focus on one of these areas at any particular time. Developing an understanding of the needs of an SME requires the questioning of assumptions. For example companies will be used to describing what they do in particular terms such as 'manufacturing' or 'service'. Often this description fails to capture other forms of intellectual property or resources that can be exploited. For example a company manufacturing pressure sensors developed a more profitable business by giving away its sensors free in return for collecting the telemetry from the devices. Providing a service based on the analysis of the data being collected by the sensors, and then presenting the resulting data in an easy to understand format, proved to be a much more successful business model. The firm's original assumptions were based on a purely manufacturing business model. The new company description is now based on being an information and visualization provider and as a result has become much more profitable.

A key first step in assisting SMEs is establishing the company's core values. The core values of an organization are the qualities for which it wishes to be recognized by its customers and employees. In the most successful organizations the core values are shared by all the internal stakeholders and are reflected in the corporate identity. If there is any disparity between the ways in which its stakeholders perceive the organization, the result is confusion, mixed messages and a lack of clear vision. The brand will not be effective. Establishing the core values of an organization is a fundamental first step that subsequently guides all other decisions. An approach we have found effective for beginning to establish the common core values of an organization or at least the values it wishes to aspire to, is one based on image sorting and the creation of mood boards. This technique asks individuals to select images that could represent some of the core values or alternatively are the exact opposite of the values they recognize. Visual imagery provides an effective way of introducing abstract qualities that can be used to describe how the company perceives itself or how others perceive it. c4di has developed visual cards that are used in combination with the capturing of key words to identify whether the companies self-image is consistent or contains inherent contradictions. For example a company may select images that may reflect environmental aspirations whilst at the same time they may wish to appear at the cutting edge of technology. These two values are not mutually exclusive but would need to be considered carefully in any subsequent branding strategy.

Observation

Observational methods are used to identify key problems or issues that we can then use to generate specific projects. In a workshop situation this is illustrated by an exercise we call 'Who Lives Here?' Groups are given photographs of someone's house showing the normal everyday interior. The group is then asked to deduce what type of person lives in the house, their occupation, and what their likes and dislikes may be. This simple technique shows how a user profile can be used to gain insights into customer needs. The 'extreme user' concept is another way of identifying issues that can form the focus for new innovative solutions. An extreme user may be someone who really loves a product or service, perhaps is an early adopter or alternatively, is someone who is actively unhappy with the product or service. It is these people that can provide genuine insights about what works or more importantly what doesn't work. For example they may have found the product or service unsatisfactory because it does not meet their needs and as a result they persistently provide negative feedback about it, alternatively they may be the person that maintains the product or service and knows more about it that anyone else as the result of firsthand experience. It could be a repair engineer for example who is most familiar with what goes wrong with a product. Fig 1 shows a standard distribution curve to illustrate where these two extreme user groups can be found.
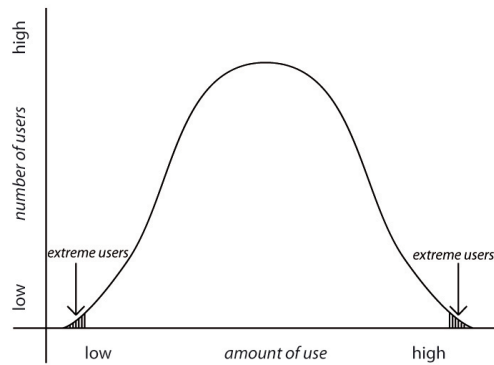
Figure 1. Extreme users are few in number who may use the product or service very little or a great deal. In either case their experiences can provide valuable insights.

The extreme user is a powerful concept for identifying the shortfalls in existing products and services. If it is not possible to identify an extreme user we can all become extreme users by simulating situations for example using restricted mobility suits to represent particular disabilities. In design terms this would be regarded as an empathic approach (Malins and McDonagh, 2008).

When examining service innovations the use of customer journey maps is a useful technique. It involves plotting the critical touch points of a customer's experience of using a service and identifying how people felt at a given touch point and comparing a number of journey maps which can then be used to identify where critical moments have occurred which can highlight opportunities for service improvement and potential innovations.

A technique based on the use of the Russian problem solving methodology TRIZ first developed by Genrick Altshuller (1946) has also proved to be effective. TRIZ was originally developed to solve mechanical or engineering based problems. In recent years it has been applied to a whole range of business problems. As a way of extending its use as a resource for service innovation the c4di team has developed a new interpretation of the original 40 TRIZ principles for applications to a business context. It is available at the c4di website (www.c4di.or.uk/servicetriz). By making this resource freely available in this way, we hope to gather feedback from users from a wide range of business experiences that can help to validate this particular use of the TRIZ methodology. The site encourages people to add their own examples and comments to illustrate how they have applied the technique. Using the web to validate tools in different contexts is an alternative way to verify the effectiveness of a process.

Ideation

Ideation involves introducing clients to a range of idea generation methods. These include facilitating brainstorming sessions using a range of intuitive methods as well as more systematic creative problem solving techniques. In the design world these are well understood and well used. The sheer volume of ideas that can be generated when these sessions are properly facilitated comes as a surprise to those not familiar with the use of these methods. For example we use the same brainstorming rules described by Tom Kelley (2004) in his book 'The Art of Innovation'. These are

- encourage wild ideas (all ideas are equally valid)

- go for quantity (the more the merrier)

- be visual (any sort of drawing is okay)

- defer judgment (evaluate ideas after the session, not during)

- one conversation at a time (all participants should have an equal say)

Following the ideation stage we then introduce techniques for evaluating ideas. These include the clustering of ideas, voting on ideas, and developing rapid prototypes.

Prototyping

Prototyping and using various forms of visualization has always been a key method in the design process. It is important to be able to see an idea as quickly as possible. To be able to talk about it, try it out with users and visualize it. We use the term prototyping to describe the cobbling together of anything that comes to hand that can be used to model an idea or concept. Recycled materials, card, and foam board can all be used. We often use Lego or other toys to develop models that represent products and services. Hence the use of the expression 'serious play' when describing these activities.

Synthesis

Working with multidisciplinary groups of individuals has proved to be a critical factor in developing new thinking and interesting ways of working. In order to establish a dialogue we begin by asking participants to identify key issues faced in their business. These are then transcribed onto hexagonal shapes. The use of hexagons is important in the way they can be pushed together physically to maximize the number of instant connections that can be made to address issues and suggest potential solutions. We then use well-known business solutions to explore how these issues have been addressed previously and then subsequently we map appropriate design methods onto these. Individual hexagon maps created in this way provide a way of gaining insight into both the problem and solution space. However the most interesting element of this technique is when collaborative maps are produced with a group of people from different businesses. The resulting map provides a shared solution space providing new perspectives on existing issues. See Figure 2.
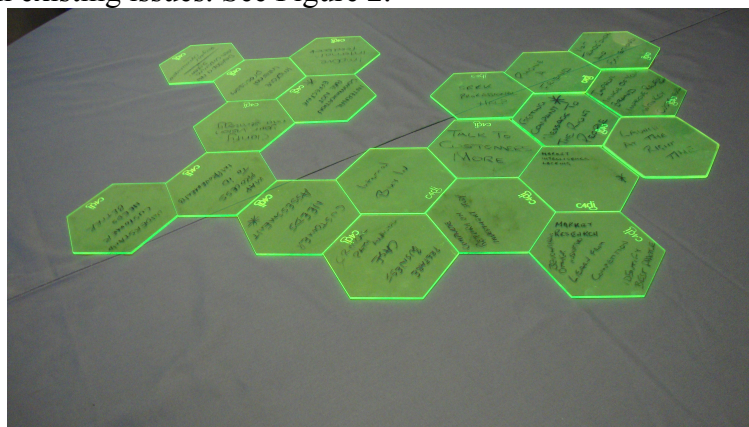

Figure 2 Shared collaborative mapping problems and solutions using hexagons

Iteration

In educational terms the idea of a cyclical (iterative) model of learning (Kolb, 1984) and reflection in action (Schon, 1983) is well understood. However, this is less well understood in the context of innovation that may be perceived by non-design thinkers as

a linear process.   Developing an approach to innovation based on the concept that it is a repeating cyclical process moving through the stages in the design process as described, is an important concept to communicate when working with companies. Developing an innovation culture based on continuously revisiting inherent assumptions means companies are well prepared for any future eventualities.

Implementation

Having identified that a particular form of innovation is appropriate for a company it is important to consider how the company's internal culture can support and implement an innovation strategy. Innovation is about new ideas and new ideas require creative thinking and creative thinking requires the right kind of encouragement. c4di has been working with SMEs to support innovation by applying design thinking to identify new products and services. David Kester (2009), CEO of the Design Council speaking on a Harvard Business School video about developing a culture of innovation, stresses the need for developing a culture of openness in which creative ideas can flourish and the need to in-bed the innovation culture into all aspects of the business is emphasized. He stresses the importance of the business being outwardly facing, in other words, asking the right questions based on acquiring a true understanding of the needs of their customers.

One of the best illustrations of how an innovation culture works can be seen in the excellent short film made by the 60 Minutes Programme in America in which the well-known design consultancy IDEO, were challenged to re-design the shopping cart in a week. During the film David Kelley (2009), of IDEO, remarks that not all the best ideas come from the boss. The film reveals the IDEO headquarters at Pala Alto in California in which bicycles hang from the ceiling and in which there is an atmosphere of fun and creativity.   Although it is more than 10 years since the original 60 Minute Programme was screened, there are still many lessons to be learned from this film from the point of view of developing a culture of innovation, including the informality of the environment, the interdisciplinary collaborative nature of the team and the willingness to prototype ideas at an early stage. As children we learn to play without inhibition but there are always rules to provide structure. As adults we find it difficult to recapture this level of uninhibited thinking. Often we are working under a whole range of pressures and constraints that inhibit creative thinking. The author Tom Wujec (2010) has worked with many different groups of individuals helping them with creative problem solving.   His workshops include an activity called the 'Marshmallow Challenge' in which teams have to build the tallest tower they can with pieces of spaghetti, masking tape and string, whilst balancing a marshmallow on top. The teams that do best in the challenge are groups of children who continuously prototype during the exercise by starting with the marshmallow first. Groups of managers tend to do particularly badly mainly because they assume the marshmallow to be light and fluffy and easily supported by the spaghetti but as time runs out for completing the challenge they discover it is not as lightweight as they thought. The lesson of these workshops is clear, that continuous prototyping is an effective strategy and that it is essential to question assumptions. Offering a financial reward to the team with the tallest tower tends to reduce the level of success. Dan Pink (2009) who writes for the Harvard Business Review has written extensively on motivation. He reports similar results to those reported by Tom Wujec. When different groups are offered financial incentives to solve a simple visual brainteaser known as the 'Candle Problem', they take longer to

solve the problem. Pink believes that the best motivation comes from providing individuals with autonomy to make their own decisions, a clear agreed purpose and the ability to become masters of their area of expertise. The working environment is critical to developing a culture of innovation (Groves, 2010). It is no coincidence that the most innovative companies in the world have the most stimulating work environments, for example, Pixar and Lego. In these companies employees are encouraged to customize their workspaces. The space is organized to encourage informal interchange that can lead to better communication between individuals and departments. An interesting approach to a work environment that connects all departments is illustrated by the BMW Leipzig Factory (2006) designed by award winning architect Zaha Hadid in which the assembly line cuts right through the middle of the offices and staff restaurant. In this way all the workers are intimately aware of the products being made and can share in the ownership of the completed product. Whilst this works very well on the scale of a car plant, how can this idea be applied to the smaller business context? The essence of this idea is to involve all the stakeholders in the business' core values making sure those values are reflected in all aspects of the business.

The importance of the team dynamic in an innovation culture has long been recognized. Companies sometimes employ behavioral and psychometric testing such as the Belbin Team Inventory (2010) to ensure employees possess the necessary team attributes. In Tom Kelley's (2005) most recent book 'The Ten Faces of Innovation', a number of key character types are described, for example, the 'Anthropologist' who identifies innovation opportunities by observing users, the 'Cross Pollinator' who develops original solutions by making connections, or the 'Hurdler' who ignores conventional thinking. These roles are not exclusive to one individual but are recognized as essential for a successful innovation culture. In a small company being able to adapt and recognize the different roles that need to be adopted is essential. Larger companies may also benefit from having a multi-cultural staff base. Multicultural approaches can often provide differing perspectives on a problem and encourage new thinking. Cultures in this context may also include backgrounds based on personal experience of working in different departments or companies. Visitors to the company can also be an important source of new input and new thinking. They have a way of asking the 'dumb' questions that businesses are too smart to ask themselves which can help to challenge long held assumptions, 'why do you do that?' 'I don't know we've always done it that way…..'. So encouraging visitors to see round a business is a good way to get feedback and new insights. Larger organizations may pay visiting experts to provide an inspiring or informative lecture that is a great way of keeping up with the latest thinking and trends. Another important activity is the 'show and tell' session. Engaging external facilitators can help to make connections between different companies, which can often lead to some very significant collaborations, and subsequent innovations. Barriers to creative thinking can be categorized into two types, internal or external. The internal type is mainly due to our conditioning from an early age. Most people don't like to be seen as strange or unusual in any way. We need to fit in but putting forward new ideas always requires a certain degree of personal risk. The risk is a loss of peer esteem that can lead to feelings of anxiety that in turn prevents creative thinking. We are worried that our ideas may be seen as stupid or unrealistic. External barriers are a result of our working environment. There may be silos between departments that work against collaboration and the innovation culture. Existing departmental structures sometimes related to budget ownership can be intractable but more important than many of the external

factors is the way that individuals receive recognition for their efforts within the organization. Recognition can be more important than other forms of reward. When the boss declares the need for a brainstorming session whilst also indicating that your job is on the line if your ideas are not at least worth a patent or two, the outcome is not likely to be great. The result is to trigger the flight response suppressing the sort of neural transmitters in the brain we need to stimulate a creative state of mind to encourage wild ideas. Without a supportive culture of innovation, the chances of developing new profitable ideas for improving products and services are going to be much less likely to occur. If the boss is the only person who can have a new idea it could be a long time coming. Developing a stimulating work environment is much more likely to encourage innovation.

Conclusion

Using design thinking to assist SMEs to bring about innovations can be very effective. The difficulty is convincing SMEs that engaging with design thinking is something they need. The term 'design thinking' is a useful way of describing a range of intuitive and systematic methods derived from design techniques. Using experiential approaches to the design of workshops has proved to be a useful way of engaging SMEs and helps to overcome the natural reticence that often interferes with creative thinking. Some of the methods described in this paper will be familiar to the professional design community but will be less familiar to organizations out-with the creative industries. c4di is positioned between the academic and commercial contexts providing an important bridge between the two. Whilst this is increasingly recognized as a valuable resource it still remains a challenge to find appropriate funding to ensure the long-term sustainability of this work. Whilst acknowledging Don Norman's proposition that 'design thinking' is something of a myth the term has provided some valuable practical methods that have resulted in some significant innovations.

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