



OpenAIR@RGU

The Open Access Institutional Repository at Robert Gordon University

<http://openair.rgu.ac.uk>

This is an author produced version of a paper published in

Swedish Design Research Journal

This version may not include final proof corrections and does not include published layout or pagination.

Citation Details

Citation for the version of the work held in 'OpenAIR@RGU':

MALINS, J. P., 2011. Innovation by design: a programme to support SMEs. Available from <i>OpenAIR@RGU</i>. [online]. Available from: http://openair.rgu.ac.uk

Citation for the publisher's version:

MALINS, J. P., 2011. Innovation by design: a programme to support SMEs. Swedish Design Research Journal, 2.11, pp. 25-31.
--

Copyright

Items in 'OpenAIR@RGU', Robert Gordon University Open Access Institutional Repository, are protected by copyright and intellectual property law. If you believe that any material held in 'OpenAIR@RGU' infringes copyright, please contact openair-help@rgu.ac.uk with details. The item will be removed from the repository while the claim is investigated.

**JULIAN MALINS**

IDEAS Research Institute
Robert Gordon University,
Aberdeen, UK

Innovation by design

A PROGRAMME TO SUPPORT SMEs

BY JULIAN MALINS

På små till medelstora företag (SMF) inser man i allmänhet behovet av innovation, men är ofta mindre klara över hur dessa innovationer ska kunna komma till stånd. En möjlig orsak till detta kan bero på en brist på kultur som stöder innovation inom den egna verksamheten. Att utveckla lämpliga verktyg för små och medelstora företag så att de kan utveckla en hållbar innovationskultur är Centre for Design & Innovations (www.c4di.org.uk) kärnverksamhet. I texten på följande xx sidor beskrivs hur små och medelstora företag har fått hjälp genom att använda sig av designtänkande för att utveckla egna innovationskulturer. Detta har skett genom ett program med workshops och **one-to-one**-stöd. Avsikten är att se bortom retoriken vad gäller designtänkande för att därefter kritiskt utvärdera de tekniker och metoder som visat sig vara av särskilt värde när man arbetar med små och medelstora företag.

En av slutsatserna är att det är svårt att

övertyga små och medelstora företag om att designtänkande är något de behöver. Utvärderingsresultaten bland de företag deltagit i workshop-programmen visar på ett större intresse för att investera i designprojekt. Denna mer visuella metod visar sig ge företagen nya perspektiv på de nuvarande innovationsstrategierna. Att påverka en företagskultur är dock en långsiktig process och det kan ta lite tid att övertyga företagen om att effekten av en dags workshop skulle kunna föra med sig både nya produkter eller tjänster.

Några av de metoder som här beskrivs kommer säkert många professionella inom design-samhället att känna igen men de är mindre bekanta för organisationer utanför de kreativa näringarna. Centre for Design & Innovation (C4di) står mellan det akademiska och det kommersiella och vill fungera som en viktig bro mellan dessa två kontexter.

Small to medium sized enterprises (SMEs)¹ are generally clear on the need for innovation; however they are very often less clear on how innovation can be achieved. One possible reason for this may be because of a lack of a culture supportive of innovation within their business. Developing appropriate tools for SMEs to allow them to develop a sustainable innovation culture is a core activity for the Centre for Design & Innovation (www.c4di.org.uk). 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 in order to critically evaluate the techniques and approaches that have proved to be of particular value when working with SMEs.

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. Additionally cultures within SMEs are highly influential as to whether or not individuals feel empowered to put forward new ideas for example companies which operate a strict hierarchical structure or very departmentalized working environments are building barriers which will mitigate against new ideas flourishing. SMEs may have a business plan which will describe a path for growth with ambitious targets. However it is more unusual to find SMEs that have a clearly articulated innovation strategy. There has been some debate as to whether design thinking is a genuine methodology for supporting innovation or a clever piece of marketing to promote design consultancies (Norman, 2010; Badke-Schaub, et al 2010). This paper does not aim to provide a detailed critique of design thinking nor does it provide empirical research to support design thinking, rather it describes the approach taken by c4di whilst working with SMEs. However the paper does describe a number of techniques derived from design practice which are intended to provide non-designers with insights into their own business practice and as such could be described as the application of design thinking. For a more in-depth description of design thinking, Nigel Cross (2011) in his recent book mixes analysis with case studies to provide

1) An SME is defined as having less than 250 employees and a turnover less than or equal to 50 million Euros http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm

insights into the way designers think.

Centre for Design & Innovation (C4di) was established in 2008 in Aberdeen, Scotland with the aim of assisting SMEs by working with them to establish a sustainable innovation strategy. The value of this type of intervention to business is endorsed by the UK Design Council through their Designing Demand initiative claiming that for 'every £1.00 invested in design, turnover rose by £50' (Ward, A. et al 2009). Innovation is about new ideas and new ideas require creative thinking and creative thinking requires the right kind of encouragement. 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 (Vygotsky, 1980; Malins et al 2003). Exercises have been developed that employ a highly visual approach involving hands-on participation and include a playful series of activities that are designed to encourage a shift in perspective whilst promoting collaborative design thinking. C4di's practice has been based on a human centered experiential approach using visualization and rapid prototyping as key methods, taking a collaborative and multidisciplinary approach to solving problems. C4di's cognitive approach is based on the reflective reframing of situations adopting a holistic integrated view. Hassi & Laasko (2010) describe a three dimensional framework exploiting the common elements of design thinking as described in the design management discourse. C4di's approach is a very close fit to the elements described in their paper.

In Don Norman's 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 team is applying an approach, which is derived from the world of design, adapting design methods to the business context. This includes observation, idea generation and visualization techniques. 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). Whilst sharing some of Norman's reservations on the way in which the term 'design thinking' has been misappropriated it still offers a useful framework for describing practical methods and approaches. The term design thinking provides a 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 developments.

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; and implementation. The following paper uses these steps to explore the various techniques that might be relevant to each particular stage in the design process as applied to business.

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. Not all companies are in a position to undertake innovation depending on their current circumstances. Ian Davis (2010), Managing Director Emeritus of McKinsey & Company, speaking on the NESTA website² 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. In this case the most appropriate innovation was in the business model itself and not related to the company's products or processes. What is critical in this example is the shift in perspective, which was required before the company could review its model which demonstrates the value of obtaining an external perspective.

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 and brand promise. 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.



Figure 1. Establish core values using image cards

2) Available: http://www.nesta.org.uk/assets/events/organising_for_innovation [Accessed Aug 2011]

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. For example an image such as the front wing of an Audi TT could represent high-tech cutting edge technology but at the same time it is a dehumanized image lacking in environmental sensitivity.

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 taking the trouble to make his or her views known. It is these categories of extreme users that can provide genuine insights about what works or more importantly what doesn’t work. Extreme users also have a way of adapting systems or products to suit patterns of use observing these adaptations can provide useful shortcuts to innovations. This is very much in accordance with von Hippel’s (1988) observations on user-generated innovation. 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 (Leonard & Rayport, 1997; Malins & McDonagh, 2008).

When examining service innovations the use of customer journey maps has proved to be 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. Figure 2 is an example of

a customer journey map that helps identify the key points where the service can be improved.



Figure 2 – Customer journey map – shared anxiety at a critical point helped to focus service improvement.

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. 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)

Idea generation techniques used by c4di have been focused on product innovation but a technique that has proved to be highly effective for business innovation has been adapted from the Business Model Generation Canvas (Osterwalder & Pigneur, 2010). In summary the canvas breaks down aspects of the business into interdependent categories, for example key partnerships; key activities; value propositions; customer relationships; and customer segments and offers a

good visual overview and helps to clarify where the focus of innovation should be directed for example this might be service or the customer experience. 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 (Schrage 1999). The term originated in the mid 1990s from work done with the Lego Company as an approach that would encourage managers to describe and challenge their own view of their business. The conceptual framework for serious play originates in constructivism (Piaget, 1951), and its subsequent development (Harel & Papert, 1991; Krogh & Roos, 1995) The connection is in the way in which collaborative dialogue takes place within the group, rapidly exploring ideas whilst being able to visualize possibilities that arise. In c4di workshops, by using character cards and scenarios to generate ideas that could form the basis of a new service, participants can understand how to anticipate user requirements envisioning new possibilities.

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 into 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 a database of established business solutions to explore how these issues have been addressed previously and then explore design methods that can be used to address the issues that have arisen.

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.

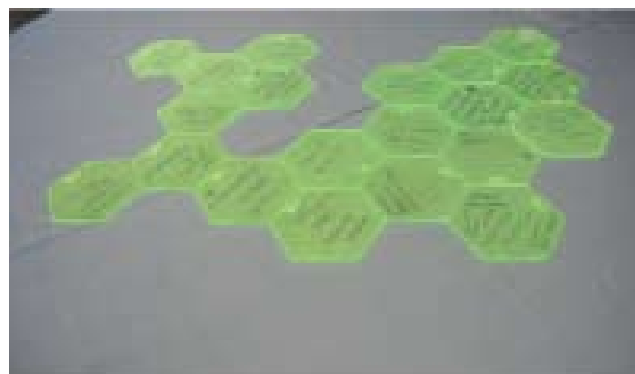


Figure 3 Shared collaborative mapping problems and solutions using hexagons.

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 single one-off event, something that only occurs more or less by accident as opposed to something that could be developed as a continuous 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. Developing an innovation culture based on continuously revisiting inherent assumptions means companies are less likely to fall into the trap of relying too heavily on their heritage rather than looking for new products or exploring new markets.

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. 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 UK's Design Council speaking on a Harvard Business School video³ about developing cultures 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.

BARRIERS TO INNOVATION

As children we learn to play without inhibition but there are always rules to provide structure. As adults we are often working under a whole range of pressures and constraints that inhibit creative thinking. The author Tom Wujec (2010)⁴ 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. Other groups mistakenly assume that the marshmallow is light and leave it to the end only to discover it causes structural collapse. 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 due to increased levels of stress that inhibits more creative solutions.

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 Factory⁵ designed by award winning architect Zaha Hadid in which the assembly line cuts right through the middle of the offices and staff restaurant giving employees a common sense of purpose.

3) Available: <http://www.youtube.com/watch?v=KyqHGdlMcas> [Accessed Aug 2011]

4) Wujec, T. 2010. Build a tower, build a team – the marshmallow problem. Recorded at TED University. Available: http://www.youtube.com/watch?v=H0_yKBitO8M [Accessed Aug 2011]

5) BMW Leipzig Plant. YouTube. Available: <http://www.youtube.com/watch?v=jL13eOXmVjY> [Accessed Aug 2011]

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. 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.....’. Barriers to creative thinking can be categorized into two types, internal or external (Kirton, 1994). 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. 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. 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

The term design thinking has possibly run its course however the underlying fundamentals remain valid (Nussbaum 2011). 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 for the delivery 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. Feedback from an evaluation study involving companies that have attended the workshop programme, has indicated increased levels of investment in design projects. Testimonials show that the more visual approach has been effective in giving companies a new perspective on their current approaches to innovation, however influencing a culture within an organization is a long term process and the effect of a one day workshop may take some time to demonstrate its impact in terms of new products or service. 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. This paper has not sought to provide a detailed critique of design thinking but has aimed to provide examples of techniques that have been found to be of value when working with SMEs, helping to overcome barriers that inhibit creativity and innovation.

REFERENCES

- Badke-Schaub, P., Roozenberg, N., and Cardoso, C.** (2010) 'Design Thinking: A paradigm on its way from dilution to meaninglessness'. Design Thinking Research Symposia, Sydney, Australia October
- Belbin, M.** (2010) *Management Teams: Why They Succeed or Fail, 3rd ed.* UK: Butterworth Heinemann.
- Cross, N.** (2011). *Design Thinking*, London, Berg Publishers Oxford UK.
- De Bono, E.** (1993). *Serious creativity: using the power of lateral thinking to create new ideas.* NY: Harper Business.
- Groves, K. and Knight, W.** (2010). *I wish I worked there.* United Kingdom: John Wiley & Sons Ltd.
- Harel, I. & Papert, S.** (1991). *Constructionism*, Ablex Publishing Corporation, New York
- Krogh, G., & Roos, J.** (1995). *Organizational Epistemology*, Oxford, Macmillan,
- Hassi, E. and Laasko, M.** (2011). 'Conceptions of design thinking in the management discourse' EAD 09 Conference Proceedings, Porto, Portugal, May.
- Herstatt, C., and von Hippel, E.** (1992). *From experience: Developing new product concepts via the lead user method: A case study in a "low-tech" field.* Journal of Product Innovation Management, 9(3), 213-221.
- Kelly, T. and Littman J.** (2004). *The Art of Innovation.* London: Profile Books Ltd.
- Kelley, T. and Littman, J.** (2005). *The ten faces of innovation: IDEO's strategies for beating the devil's advocate and driving creativity throughout your organization.* USA: Doubleday.
- Kirton, M.** (1994). *Adaptors and Innovators: Why New Initiatives Get Blocked.* Long Range Planning, Vol. 17, 137-143.
- Kolb, D.A.** (1984). *Experiential Learning.* New York: Prentice-Hall.
- Leonard, D., and Rayport J.** (1997). *Spark Innovation in Empathic Design*, Harvard Business Review, Nov 01
- Malins, J. Gray, C., Pirie, I., and Cordiner, S.** (2003). *The Virtual Design Studio: developing new tools for undertaking design research.* In: Proceedings of the 5th European Academy of Design Conference. April. Barcelona: University of Barcelona.
- Malins, J. and McDonagh, D.** (2008). 'A grand day out: empathic approaches to design'. The International Conference on Engineering and Product Design Education, Universitat Politècnica de Catalunya, Barcelona, Spain, 4-5 Sept: pp105-109.
- Norman, D.** (2010). 'Design thinking: a useful myth'. Core Magazine Industrial Design- Magazine and Resource/Blog. Available: http://www.core77.com/blog/columns/design_thinking_a_useful_myth_16790.asp [Accessed Aug 2011]
- Nussbaum, B.** (2011) 'Design Thinking is a Failed Experiment, So What's Next?' <http://www.fastcodesign.com/1663558/design-thinking-is-a-failed-experiment-so-whats-next> [Accessed Aug 2011]
- Osterwalder, A., and Pigneur, Y.** (2010) *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers.* Wiley Desktop Editions.
- Piaget, J.** 1951. *The Psychology of Intelligence.* London, Routledge and Kegan Paul.
- Schon, D.A.** (1983). *The reflective practitioner: how professionals think in action.* USA: Basic Books Inc.
- Schrage, M.** (1999). *Serious Play: How the World's Best Companies Simulate to Innovate*, Harvard Business School Press
- Vygotsky, S.** (1980). *Mind in Society: The Development of Higher Psychological Processes* Harvard University Press
- Von Hippel, E.** (1988). *Sources of Innovation*, Oxford University Press Inc, NY