Enabling the future of innovation

Role of standards in delivering new innovative products

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Introduction

What is Innovation Management?

Speed and quality of innovation has become crucial to surviving in highly-competitive markets. However, it is not just commercial businesses that need to innovate. The demands of society and the drive for better value mean that any organization, from a public health service to a charity, needs to find new and better ways of doing things.

When seemingly all the effort of an organization is focused on day-to-day operational activity it can be difficult to find the time and resources to concentrate on new products, services or processes.

To be effective, innovation needs to become embedded within an organization and not be an ad hoc or one-off event. By establishing an innovation system senior management can create an environment where people are encouraged to bring forward ideas knowing that they will be formally evaluated and, if appropriate, developed for the benefit of the whole organization.

BSI has a comprehensive library of management standards for manufacturing, business, quality, assets and data security. These standards reflect best practice and by following them organizations can significantly improve their performance and abilities to innovate.

Jonathan Knight, Chairman of the Innovation Management committee IMS/1

Contents:

The need to innovate

Dr George Wilson, Consumer Representative, Consumer and Public Interest Network, at BSI Group outlines the importance of innovation process and its impact on a long-term profitability.

Any organization which ceases to innovate will soon be left behind and will decline.

Innovation is the essential process that translates inventions or ideas into commercially viable products or services that bring value to end-users as well as to our economy. Innovation is a separate process that fits between invention or discovery and commercialization. It is key to increasing a company's competitiveness, market share and long-term profitability.

However, innovation does not always derive from within an organization. Customers, suppliers, economic and political conditions can all be sources of new ideas. Collaborating with other organizations and even competitors can lead to improved performance, be it financial or operational. Standards are useful in these conditions as they guide managers through the principles of collaboration with its issues of intellectual property protection and sharing of technical expertise.

So what is an innovation?

New ideas can lead to innovations and incremental improvements to the 'big idea'. The important thing is that they add value: financial, social or emotional. However, innovation does not necessarily have to be 100% original. An invention is about creating something new while an innovation is usually an invention that causes changes in behaviour or interactions.

Most innovations are evolutionary changes to existing processes, uses or functions. The iPhone shows us that as a product viewed from a technical perspective, it was a consolidation of previous concepts, devices and features, however as an innovation it can be considered ground breaking; ushering in a plethora of technological and social changes from media content to telecommunications and beyond.

The story of the Desoutter brothers greatly describes how a need led to innovation. Marcell Desoutter was a pioneer pilot in the early part of the 20th century but lost his leg when he crashed his plane. In 1914, when fed up with his cumbersome wooden leg, his brother Charles constructed Marcell a lightweight limb made from a new material at the time, aluminium. The brothers went on to found a successful company making prosthetic limbs to meet demand following the First World War.

It is said that Charles's inspiration came from a German model aeroplane, given to them by their father, which had a drilled aluminium fuselage. Later the brothers developed a range of power tools driven by compressed air with which to manufacture their prosthetic limbs. Once again they turned to the model aeroplane for inspiration which had a compressed air motor. Desoutter developed into a global company and still makes air power drills and tools for industry and medicine.

Innovative businesses are more likely to export, employ more qualified staff, and 40% collaborate to innovate, mostly with industry


120
89
205
4821
360
98
124

How do standards help to boost innovation?

Martin McGurk, Innovation Director, RTC North, talks about the increasing interlink between standards development and innovation.

Contrary to popular belief, the vast majority of innovations don't come out of the blue like the apple falling on Newton's head; they are brought about via a defined set of activities that can be grouped under the heading "managing the process of innovation."

Standards boost innovation and help organizations adopt a more strategic approach from an early stage, giving them a framework to manage and assess their innovation activities to maximise the value they can achieve. National Endowment for Science, Technology and the Arts (NESTA) studied the relationship between standards and innovation and, despite the limited empirical evidence of the impact available, stated that "standards can be relevant from the very beginning of new technologies, i.e. even in basic research, over a market formation phase until the broad diffusion of innovations via standards." [1]

How does standardization enable innovation?

Organizations are looking for access to world class expertise in how to lead in areas of innovation and standards are an excellent tool for industry to accelerate innovation and performance improvement. Standards are fundamental to innovation in today's economy. Innovation is no longer a matter of transferring industrial technologies, but the broader organizational, economic and social embedding of these new technologies in a development environment.

Innovators are inherently looking for solutions and if a standard concisely outlines the best current practice it can save the user time in researching an excess of other sources. At the very least it should provide a solid starting point from which to explore further. Standardization demonstrably improves an organization's performance and has been proven to be useful in terms of kick-starting innovation as they:

- ✓ Agree common terminology and transfer new information into the commercial environment, which accelerates the spread of innovation
- ✓ Support innovators by providing expert, authoritative new knowledge, which in turn is a platform for further innovation
- ✓ Build communities and promote the exchange of knowledge, which catalyses collaborative development
- ✓ Encourage process innovation through continual improvement
- ✓ Enable organizations to unlock their full potential in terms of their products, processes and behaviours.

There are some clear benefits delivered by standards[2]:

- **Lower costs**
- **Risk reduction**
- **Greater opportunity for bespoke production of goods or services**
- **Environmental benefits**
- **Wider accessibility**
- **Effective monitoring and feedback mechanisms**
- **Speedier dispute resolution and redress.**

References
1. The Impact of standardization and standards on innovation', NESTA 2013
2. Economic Contribution of Standards to the UK Economy, Cebr

Role of standards in support of innovation

National Endowment for Science, Technology and the Arts (NESTA) studies the relationship between standards and innovation and reveals major insights in its reports[3]. It is clear that "standards can be relevant from the very beginning of new technologies" ('The Impact of standardization and standards on innovation', NESTA 2013).

The suite of Innovation Management standards concentrate on defining management processes and optimisation. The standards can be used by smaller companies or start-ups that do not have the expertise and resources required to take their ideas forward. Alternatively they are also beneficial to multinational corporations with well-developed proprietary systems and others that follow one of many off-the-shelf innovation software products.

Standards boost innovation and help to achieve:

1. Enhances growth, revenues and profit from innovations
2. Brings fresh thinking and new value to the organization
3. Helps identify and mitigate risks.

Organizations need all three types of standards to deliver products and services for the rapidly changing world market. Although all standards have the same basic purpose of setting out agreed principles or criteria, different subject areas and user groups have needs for differing forms and levels of standardization.

Three different types of standards

1. Product

Technical interoperability underpins efficiency and focusses innovation in areas that add value

- Interoperable components
- Materials specifications
- Test & verification methods
- Interoperability of data
  - Concept models
  - Discovery
  - Formats
  - Use of data

2. Process

Demonstration of quality enables organisations to work together

Management systems

- Quality Management Systems (ISO 9001, AS 9100, ISO/TS 16949)
- Environmental Management Systems (ISO 14001)
- Information Security (ISO 27001)

Process optimisation

- Design for manufacture, assembly, disassembly and end-of-life processing, "MADE" (BS 8887)
- Asset management (ISO 55000)

3. Framework

Values & Behaviour

- Better collaboration (BS 11000)
- Smart City decision making framework (PAS 181)
- Robot ethics (BS 8611)

[3] 'We are building a formidable system for measuring science - but what about innovation', NESTA 2017

Key standards for innovation management

BS 8538 Specification for the provision of services relating to the commercialization of intellectual property rights.

The British Standard BS 8538 provides best-practice recommendations for the services that relate to the commercialization of intellectual property rights. This includes copyright, trademarks and patenting, and is the first of its kind to set out principles of ethical behaviour for organizations providing services to investors.

BS 8538 looks at the principles for ethical behaviour and defines integrity and competence. It explains how to ensure transparency of services, charges and other payments or receipts. The standard also focuses on confidentiality and the disclosure of information, as well as the declaration of interests and conflicts. Other topics include complaints handling and non-disclosure agreements.

Development of the BS 8538 Standard

In 2006 I approached the BSI about the development of a suitable standard.

Shortly after Trevor Baylis Brands plc held a meeting with Lawrence Smith-Higgins representing the IPO and representatives from the Metropolitan Police Fraud Squad whose primary concern was the counterfeiting of all types of goods. They were interested in understanding more about the infringement of intellectual property rights (IPR) as that might be a way of combating some of the fraudulent activity. Subsequently, thanks to the work done by Lawrence, the Patent Office (now the IPO) agreed to sponsor the development of the standard and the process was started in early 2007.

The standard development process was a compromise between setting out broad principles and dealing with specific detail. I believe that the standard is still relevant seven years later and whilst it has never been imposed as a requirement on companies dealing with intellectual property the need to at least claim compliance with it has curbed the worst excesses that were taking place in the early 2000s.

David Bunting
CEO at Trevor Baylis Brands plc

Design management standards

Design management has developed over the last half century as a business discipline and the related standards are an attempt to encapsulate the latest understanding and give practitioners a guide to incorporate these concepts into the organization of their design work.

The second part of design management systems, a guide to managing the design of manufactured products, was updated in 2015 to incorporate new developments. In particular, the concepts of designing to enhance the potential of reusing a product or its components, at the end of its life in service. Importantly, innovation is derived from the design process.

All design aims for uniqueness, but only if that novelty produces a step change in its market does it become an innovation.

Colin Ledsome, Vice-Chairman, Institution of Engineering Designers

BS 7000 Design management systems

The design comes in many parts and provides a strategic framework and associated processes by which business executives and design practitioners can understand and respond to the needs of diverse users without stigma or limitations.

PD CEN/TS 16555 Series on innovation management

This series provides the best practice guide on introducing, developing and maintaining a framework for systematic innovation management practices. Establishing such a management system allows organizations to become more innovative and achieve more success with their product, service and business processes.

“For every £1 invested in design, a business can expect £20 back in turnover”

Design framework for innovation

Design Council explains how an established design framework helps explore and define innovative opportunities

Design is integral to innovation. "It is the link between creativity and innovation, shaping ideas to become practical and attractive propositions for customers and users."[4] Design Council's work with more than 5,000 SMEs between 2006 - 2015 demonstrates the value that design can unlock innovation in businesses across a broad range of industries. An independent evaluation of this work found that for every £1 businesses invested in design, they could expect to return £20 in turnover, over £4 increase in net operating profit and over £5 in increased exports.[5]

However the process of implementing an industry standard across the design innovation is extremely complex. Design teams, design consultancies and freelance designers work across communications, digital and multimedia, interior and exhibition, product and industrial, and fashion and service design disciplines.

Each of these disciplines has different principles and practices, are represented by different bodies and would, therefore, be evaluated by different standards. Throughout its work within both the private and public sectors, Design Council has applied its 'Framework for Innovation' which provides organizations with a structured and proven process to use design to explore, reframe and define scalable innovation opportunities.

Within this framework sits its Double Diamond: a globally recognised design process that supports a structured design approach to tackling challenges in four phases:

- ✓ Discover: gaining new insights into the challenge
- ✓ Define: identifying the area to focus on
- ✓ Develop: exploring potential solutions
- ✓ Deliver: delivering solutions that work

A fourth generation family manufacturer in the construction industry used this process to identify and implement a more systematic approach to product innovation. Naylor Industries was experiencing declining sales for their clay drainage pipes due to a construction industry recession and the erosion of the clay pipe market by plastic materials.

To tackle this challenge, working collaboratively with people from across the business, the team discovered needs and opportunities beyond their existing market. These included the production of clay flowerpots where they identified the need for good quality, British-made, durable flowerpots, which became a focal point of their development process. Through this process, they also defined a blueprint for innovation that would allow them to develop new, and potentially scalable, ideas across the business.

Naylors delivered Yorkshire Flowerpots and in the first three years annual sales of the range grew rapidly from £500,000 to £5m. Naylors is now one of Britain's largest manufacturers of clay pots with exports representing 10% of sales. Their chief executive, Edward Naylor, explains how the design process has been integral to innovation: "In traditional manufacturing businesses design is often seen as irrelevant but our experience is different. Any business, however purely functional its product appears to be, can win by using design."

[4] http://webarchive.nationalarchives.gov.uk/20120704143146/http://www.hm-treasury.gov.uk/d/Cox_review-foreword-definition-terms-exec-summary.pdf
[5] Eden Partners evaluation of Design Council's Designing Demand programme 2012

Innovate UK:
Working together to support new technologies

Dr Kath Mackay, Head of Precision and Discovery medicine at Innovate UK, explains how standardization can be applied to improve the cell therapy manufacturing as well as to establish a framework for further standards development.

Innovate UK is the UK's innovation agency. They are the prime channel through which the Government incentivises innovation in UK businesses. They guide, mentor and fund high growth companies, accelerating economic growth and helping companies to bring new products and services to market faster. They focus our activities on areas where the UK has strong capability and where we can make the biggest difference, with our experts providing leadership support in four key industrial sectors; Health and Life Sciences, Infrastructure Systems, Materials and Manufacturing, and Emerging and Enabling Technologies.

In working closely with the UK's best businesses, they can see directly how innovation creates new products, services and entire industries. By definition the businesses they work with can be small in size and limited by resource. Often the landscape for these businesses is disparate and this can create a market failure in that there is no critical mass of industry to drive the creation of new standards.

Standards have an important role in driving innovation and bringing products to market and are seen as a useful alternative to government regulation or legislation where this has not been developed.

Innovate UK has worked with BSI to support the creation of standards across a range of technologies in internationally competitive areas, where it was important that the UK created successful capability quickly. One such area is innovation in cell therapy manufacturing.

Cell therapies involve treatment of patients with live cells and offer the potential to transform how conditions that lie beyond the reach of classic pharmaceutical approaches are treated. This is an exciting area that Innovate UK has supported since 2009 through a targeted funding programme in regenerative medicine and cell therapy, and through the establishment of the Cell and Gene Therapy Catapult in 2012. The development costs of each new cell therapy product reaching the market are significant and a better approach to manufacture would be advantageous to UK businesses.

Innovate UK supported BSI to work with the Cell and Gene Therapy Catapult and the wider stakeholder community to establish how best standardization could be applied to improving the practice of raw material selection in cell therapy manufacturing processes, producing a framework for standards for innovation in cell therapy manufacturing.

> Standards are seen as a useful alternative to government regulation or legislation

The Centre for Process Innovation: An analytical approach to innovation management

Graham Hillier, Director of Strategy and Futures at CPI, outlines the key factors that influence the success of the product development.

The Centre for Process Innovation (CPI) was established to support the UK's process manufacturing industry. The organization provides partners with technical, financial, commercial and operational guidance; space, equipment and training; research, development and innovation support; support to build collaborative partnerships; innovation assets and a team with a deep understanding of innovation processes.

All these services help universities, SMEs and large corporations to overcome the challenges of innovation. CPI has particular strengths in helping companies within the biologics, formulations, graphene, printable electronics, and industrial biotechnology and biorefining sectors.
Regardless of the industry, however, CPI has identified a set of eleven specific factors that must be considered, and the associated challenges to overcome, in order to ensure the successful journey from innovation to commercialization.

Understanding how to overcome these challenges depends on the innovator company's specific situation and its current stage within the innovation process. Accordingly, CPI has developed the Innovation Integrator® model which is a structured diagnostic tool that is used to define where a company sits within the innovation continuum (Fig 1), and then identifies the actions that must be taken in order to progress to the next stage.
The innovation process is required to take an innovation-ready idea forward into a product or service that is then investor-ready and suitable for commercialization.

The Innovation Integrator® tool assesses the company's assets, including the finances, innovation assets, IP, the lead entrepreneur and the company's other people; the innovation's underpinning science and independent endorsement; the market need for the innovation, its value and price combination; the supply chain; and legislation and regulation of relevance to the innovation (Fig 2). This in-depth assessment provides a picture of the innovator's current delivery capability and position on the innovation continuum together with a detailed report on which of the eleven factors should be addressed in order to proceed towards commercialization.

CPI's experienced technologists and skilled business teams help the innovative company address the factors that are most important to take their product or service to market.

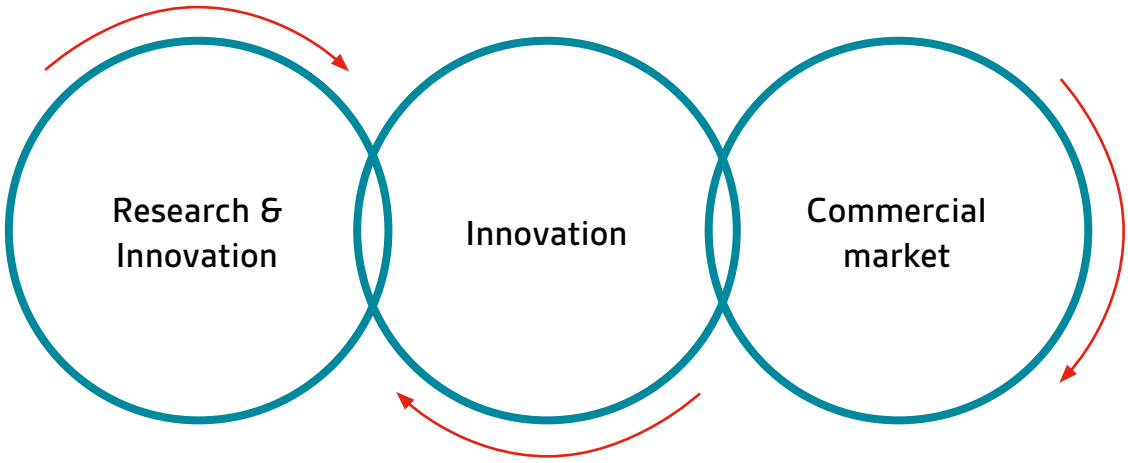

Figure 1: *The Innovation Continuum – from innovation to commercialization.*

> **The innovation takes an idea forward into a product or service that is then investor-ready and suitable for commercialization.**

Successful innovation depends on having 11 critical factors in place supported with long-term commitment and collaboration.

For example, CPI is working with Silent Sensors Ltd, a UK-based SME that has developed new tyre safety management technology that monitors tyres from the manufacturing process, through the supply chain to the vehicle on the road. The technology collects continuous data about the tyres and these data can be presented on dashboards for fleet management or to provide warnings to the vehicle driver. CPI has been assisting Silent Sensors with the development of printed electronic sensors that can be incorporated into the tyre manufacturing process.

The collaboration began with an Innovation Integrator® assessment of the business that identified a number of actions to address in order to ensure successful product development. CPI's continued support has enabled Silent Sensors to progress its technologies and develop two complementary products for tyre tracking that are now being scaled up for production.

The legislation and regulatory aspects of any innovation must always be considered early in the innovation process as requirements and standards vary in different countries. In some cases there is no existing regulatory framework in place and the innovator needs to work with the relevant authorities to create a new system.

Innovation in other industries is also leading to changing legislation such as in the rapidly growing area of biologics where the industry has had to develop new processes for analytics, monitoring, clinical trials and safety standards for safe manufacturing and administration of these drugs. Similarly, nanotechnologies and emerging developments in electronics will require close co-operation of innovators, industry bodies, governmental organizations, BSI and regulators to ensure adequate regulations and frameworks for future products.

Successful innovation:

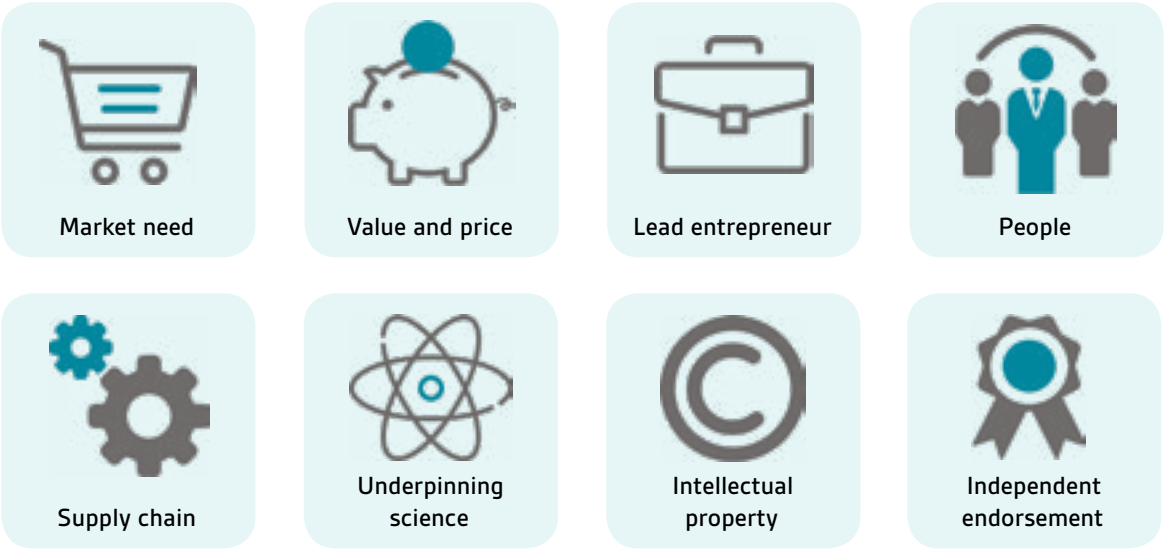

Figure 2: *The CPI Innovation Integrator® process.*

If you would like to find out more about standards please get in touch:

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