

A TOPOGRAPHICAL MAP OF THE INNOVATION LANDSCAPE

V.E. Ross, A.W. Kleingeld and L.Lorenzen¹

Centre for Process Engineering
University of Stellenbosch, Private Bag X1,
Matieland, 7602 South Africa

ABSTRACT

This paper describes the construction and use of a topographical map of the innovation landscape. The purpose of the map is to provide a holistic view of the key factors that enable innovation (the so-called 'landmarks'), how well they are aligned to support the particular type of innovation the organization needs to pursue, and to identify possible gaps.

The landmarks are found in four strategic business *directions*, namely (1) change, (2) people, (3) resources, and (4) operations. The landscape covers four *domains* that influence innovation - the attributes of the individual, the organizational context in which he/she functions, the business environment (the market / industry in which the organization is operating) and the external environment. The significance (importance) and height (performance) of the landmarks in supporting and enabling innovation within the organization is determined by means of a self-appraisal audit. The topography of the landscape derived thus is subsequently interpreted in terms of the organization's particular strategy.

The application of the innovation map is illustrated in three different organizations within the Chemicals as well as the Mining & Metallurgy industries of South Africa. Our research in the private sector, and the innovation literature pertaining to the public sector, have suggested that the key factors that enable innovation do not differ substantially, provided the different contexts are taken into consideration. Therefore, we propose that this methodology, originally developed for the private sector, may be applied equally successfully in public sector organizations.

1. INTRODUCTION

The perpetual race for competitive advantage is driving organizations all over the world to become increasingly innovative in the way they conduct their business. Although public sector organizations have traditionally been shielded largely from the pressures that their private sector counterparts have been experiencing on improving performance, cutting costs and providing better service, they are no longer exempt from the influence of global competitiveness. The need to innovate therefore is an issue growing in importance for these organizations, especially as the

¹ Contact person: **Error! Main Document Only.** Prof Leon Lorenzen, Deputy Dean, Faculty of Engineering, University of Stellenbosch, Private Bag X1, Matieland, 7602, Stellenbosch, South Africa, Tel: +27 (21) 8084496, Fax: +27 (21) 8082059, E-mail: LL1@sun.ac.za, www.chemeng.sun.ac.za

public demand for cost-efficient service increases to levels that have been the benchmark in the private sector until only very recently. Indeed, public sector innovation has grown to such proportions in certain areas, especially information technology and e-business, that they are reported as among the leaders (Deloitte Consulting, 2001).

In the light of this challenge, a multitude of initiatives have grown, not only from the side of government, but also from the private sector. Typical examples include the following:

- Specialized institutions / units for innovation, e.g. The Public Sector Innovation Unit of Norway and the US National Institute for Government Innovation (NIGI) .
- Government programs for research on public sector innovation, e.g. Victoria Link's (New Zealand) public sector research project, Cases in Public Sector Innovation.
- Innovation Awards, e.g. The Institute of Public Administration of Canada's Innovative Management Award Competition, The Ford-Kennedy School of Government Innovations in American Government Awards and the Commonwealth Association of Public Administration and Management International Innovations Award.
- Private Sector Partnerships, e.g. The Cisco Public Sector Innovation Council and British Telecommunications (BT) Innovation Centre for the public service industry.

Such initiatives have no doubt fostered a greater awareness of, and commitment to, public sector innovation in general. However, when compared to their private sector counterparts, many of these organizations are still on a fairly steep learning curve with regard to the way in which they should manage innovation, and which factors are the most important in achieving meaningful and sustainable changes to the bottom line. In no small way, this is further compounded by the fact that innovation needs to happen in an environment that is mostly not conducive to risk-taking, in which rigid organizational structures often prevent informal communication and sharing, and in which resources are severely constrained by tight budgets and centralized control.

The major focus of our innovation research over the past two years has been on the factors that enable different types of innovation, how this supports the particular strategy that the organization is pursuing, and how it relates to the dynamics of the business context in which the organization is functioning. An outcome of this work was a tool that guides managers in developing capabilities that would be aligned with the particular type of innovation the organization was pursuing. This tool - a topographical map of the innovation landscape and its key landmarks - also provides a structure for interpreting the innovation performance of the organization, and ensures an explicit link with the organization's strategy.

While to date this tool has been applied only within the private sector, it has been structured in such a way that it offers a generic view of the factors that influence innovation. This includes four 'directions' that are of strategic relevance to any organization, namely the process of change (this covers issues such as vision, strategy, leadership etc), its people (personal styles, skills, knowledge etc), resources (capital, information, infrastructure etc), and operations (internal business processes, systems etc). It also takes cognisance not only of the factors internal to the organization that support innovation (creativity, climate, etc) but also those in the business environment that the organization is functioning in (customers, suppliers etc), and those in the broader external environment (technology, environmental, etc).

The purpose of this paper is to investigate whether this tool can also be applied within the public sector. Hence, it will cover the following three areas:

1. Explore the similarities and differences between innovation in the public sector and the private sector.
2. Describe the development of a map of the innovation landscape, and how the landmarks are audited to provide a topography of the landscape.
3. Illustrate how the map may be used to establish the alignment between an organization's particular strengths and the type of innovation required in a particular context (its innovation strategy).

2. PUBLIC VS PRIVATE SECTOR INNOVATION

The literature on the enablers of innovation in public sector organizations is not as mature as that of the private sector: most of the significant studies in this area have only been conducted fairly recently. It is thus the purpose of this section to explore the similarities and differences between the enablers of private and public sector innovation in an attempt to identify the “critical success factors” that govern successful change and innovation in the public sector.

Numerous case studies and empirical investigations have been conducted in an attempt to provide scientific evidence of the impact of enablers of innovation on company performance and the success of new product development. Although the majority of these studies focus on technological innovation, the parallels between this type of innovation and service or process innovation are clear², especially when defined in terms of the enablers of innovation.

In our work on private sector innovation, and the auditing thereof in large organizations, we have adopted a classification of the enablers of innovation according to four domains that influence the process and collectively determine the nature of innovation, termed strategic perspectives. This classification has special significance in comparing the body of knowledge (degree of understanding) on the enablers of public versus private sector innovation, as this discussion will attempt to clarify. The four strategic domains are:

1. *The individual* - the intrinsic qualities of the individual and how he/she is motivated for creativity and innovation. This includes, amongst others, intrapreneurship (Livesay *et al.*, 1996), championing (Frohman, 1999; Markham & Griffin, 1998), corporate storytelling (Buckler & Zien, 1996) and learning and growth (Lynn *et al.*, 1998).
2. *The organization* - the factors in the organizational environment that either promote or hinder innovation. These range from leadership and management to systems, quality and business processes. In this regard, Cooper and Kleinschmidt (1995, 1996) and Lester (1998) report a number of 'critical success factors' for new product development. From an auditing

² The work of Damanpour and Gophalakrishnan (1994, 1998), which relates organizational structure and environmental change to the nature and type of innovation, investigates the validity of this statement.

perspective, the work of Tang (1999) and Chiesa *et al.* (1996) has contributed significantly towards understanding the role of key processes that enable innovation³.

3. *The business context* - the extent to which the organization interacts with and benefits from suppliers and competitors, their understanding of the customer and his needs or preferences. This domain is essentially governed by enablers resulting from the five competitive forces of industry profitability, identified by Porter (1985).
4. *The external environment* - the awareness of factors outside the industry that could shape or influence the organization's mission and business objectives, and hence innovation. Enablers in this domain include strategic scanning, new markets, exchange programs and financial and technical sponsorship provided through government initiatives.

In these domains, we have distilled a number of enablers that are key to innovation. These so-called 'landmarks' on the innovation landscape are presented in Table 1; collectively they cover the entire spectrum of issues that are pertinent to innovation and the measurement thereof.

In an attempt to compare the enablers of private and public sector innovation, a survey of the literature on public sector innovation was undertaken. This revealed that the majority of research on public sector innovation has focused on the role of the individual, while enablers of an organizational, business or environmental context (as classified above) have received comparatively little attention. This can probably be attributed to two factors:

1. *Maturity of research.* Since research on public sector innovation is relatively young compared to that on private sector innovation, it is understandable that the majority of research will be limited to the individual's role in innovation. Many parallels exist in the way individuals are motivated for creativity and innovation, irrespective of the environment in which they operate. Most of the observations and conclusions on the role of the individual in private sector innovation may therefore be extrapolated to the public sector (Glor, 1998, 2001; Lyonais & Houle-Rutherford, 1996).

Table 1. Key enablers of innovation (abbreviations refer to Figure 1).

The Individual	
Motivation and challenge (mo)	Learning and growth (lg)
Recognition and reward (rr)	Skills and competences (sk)
Creativity (cy)	Championing (ch)
Organizational Environment	
Leadership (lp)	Design (dn)
Vision (vn)	Internal processes (pr)
Organizational culture / values (ov)	Auditing [Post-innovation audits] (au)
Management (mt)	Quality (qy)
Information and communication (ic)	Infrastructure and resources (if)
Experimenting (ex)	Systems and tools (st)
Diversity (dy)	Strategy (sy)

³ In the interests of parsimony, only papers that provide a general and holistic view of all the factors driving innovation in organizations are mentioned here. There exists a large database of articles on each of the enablers of innovation that fall in this domain.

Business Context	
Conferences and exhibitions (ce)	Benchmarking (bm)
JV's and partnerships (jv)	Competitors (cm)
Customer needs (cn)	Suppliers (su)
External Environment	
Strategic scanning (ss)	New markets (nm)
Networking (nw)	Government programs (gp)

2. *Process-constraints and internal focus of PSOs.* The largely internal focus of PSOs (i.e. the relative lack of drive for innovation from customers and other external parties), coupled with strict and regimented systems and operational procedures, necessitates a deliberate focus on the individual to drive or champion change whenever the opportunity might present itself - in the public sector, the individual is seen as the gateway to change.

The enablers associated with the individual's role in public sector innovation are thus clearly understood: reports on how public sector innovation has been stimulated through improved learning and growth (Loucks & Robertson, 1999), creativity (Nagel, 2000) and championing of projects (Manley, 2001) provide valuable proof of this fact.

On the other hand, enablers of public sector innovation in an organizational and business context have received less attention. The majority of research in this case has been directed toward the establishment and promotion of a so-called culture of innovation, encompassing issues such as support, trust and tolerance, risk-acceptance and empowerment of people (Lynch, 1999; Glor, 1997). Other issues often addressed are the role of management in supporting innovation (Lyonnais & Houle-Rutherford, 1996; Beukman & Harfield, 1998), partnerships with private sector companies (Lynch, 1999) and improved interaction with 'clients' (this point will be elucidated later). However, enablers in this group/context are seldom reported or discussed as a whole, and have never been investigated holistically.

Borins (2001), in an analysis of data from US and Commonwealth innovation awards, has, however, paved the way toward identifying and investigating a number of enablers of public sector innovation in an organizational context. These enablers are implicitly defined in the following hints he provides for building innovative public sector organizations:

1. *Management support* of an innovative culture that encourages experimenting.
2. Establish a central *innovation fund* to support innovative ideas.
3. Encourage *diversity* of backgrounds and ways of thinking within the organization.
4. Actively seek *information* from the outside via *benchmarking*, site visits, and professional *networks*.
5. Expect that staff must *innovate at all levels* of the organization.
6. Support *experimenting* and evaluation of experiments - recognize that failure is possible, but that it is part of taking risks. *Learn from mistakes*.

Macpherson (2001), in his discussion on performance excellence principles in PSOs, identified four main differences between private and public sector innovation. Having just identified and discussed the enablers of innovation in the private and public sectors according to the literature,

these differences may be used to gauge the degree of commonality between the enablers of private and public sector innovation. It was reported that the public sector differs from the private sector in terms of:

1. *Customers and markets.* Customers and market interests do not drive innovation as directly as in the private sector. Rather, internal interests, such as problems, political influence and new leaders (Borins, 2001) are the main factors.
2. *Risk.* PSOs are by nature risk-averse. This is due to the fact that there are few rewards, either financial or political, for taking risks and succeeding; the penalties associated with risk and failure present even bigger obstacles to creativity and innovation.
3. *Process-constraints.* Since PSOs are governed by powers from central government and stringent regulation, there is little room for experimenting and re-engineering in the workplace. Planning, operational and reporting requirements thus represent major factors that hamper innovation.
4. *Accountability.* Due to the fact that different groups in a PSO (elected officials, chief executives, the state, etc.) normally have different ownership interests in a project, there is a continual need to trade off conflicting stakeholder needs. This results in a lack of accountability for the project.

Although it may be argued that the private sector has traditionally been more customer and market focused than the public sector, it is the opinion of the authors that this distinction is dwindling fast. Public sector organizations are rapidly realising the need to drive innovation via more intimate interaction with its clients, hence for instance the movement toward citizen-centred service (Blyther & Marson, 1999) with a focus on citizen/client satisfaction surveys (Schmidt & Strickland, 1998).

Considering the remaining three characteristics of PSOs highlighted above (risk-averseness, process-constraints and accountability), it may be argued that they are not unique to the public sector, since they are also prevalent, perhaps to a lesser extent, in private sector organizations. This has proved to be especially true in some operational environments we have audited (commodity production plants and mines), that are by nature risk-averse and process-constrained. It is indeed the purpose of an audit to explore the degree to which these factors drive (or retard) innovation in organizations - while risk-averseness and accountability are measured under Organizational culture (values), process-constraints may be benchmarked under enablers such as Processes and Auditing (as indicated in Table 1).

Thus, in light of the large degree of correlation between the enablers of private and public sector innovation reported in the literature, it may be concluded that the enablers of innovation in private and public sector organizations are similar. A most significant result of this conclusion is that the auditing tool currently employed in the private sector may also be applied with success in the public sector, provided that the contextual differences necessitated by different operating environments are kept in mind.

3. A MAP OF THE INNOVATION LANDSCAPE

Having identified the key enablers of innovation in an organization, the primary objective of our work was to develop a tool – a topographical map – that could be used to provide a holistic view

of the strengths of these enablers and to show how well they are aligned to support a particular innovation strategy. This strategy, which pertains to the type and nature of innovation that needs to be supported, is governed not only by the environment in which the organization operates (Damanpour & Gopalakrishnan, 1998), but also by its particular customer strategy (Treacy & Wiersema, 1995). These factors dictate the organization's proclivity toward radical innovation (as opposed to incremental innovation), technical innovation (as opposed to administrative innovation) and area of innovation: be it in product, process or service.

This was accomplished by profiling each enabler according to the strategic areas with which it is associated most closely, or in which it has the most relevance. The four areas are as follows:

- *Resources* (including infrastructure, capital, technology, information, systems)
- *Operations* (internal processes, implementation, maintenance, measurement and control, organizing, planning)
- *People* (reward and recognition, motivation, teamwork, sensing, relationships, etc)
- *Change* (strategy, vision, leadership, creativity, synthesizing).

As shown in Figure 1, each landmark is assigned a position on the landscape according to the extent to which it is related to the four strategic areas; in practice this information is obtained via a separate workshop. For example, while leadership (represented by the 'lp' landmark) is perceived to have a significant role to play in mobilizing people and providing direction during times of change, management is deemed more significant in terms of keeping operations ticking over successfully, looking after measurement, planning and implementation.

The height of each landmark represents either its perceived performance (P), importance (I), or alternatively their ratio (P/I), in the organization. This for instance facilitates quick identification of enablers that are strategically deficient, i.e. those that have a high perceived Importance in a particular context or environment, but which are not leveraged sufficiently well (i.e. a low Performance). On each landscape, the peaks therefore denote relatively high scores while the valleys represent low scores.

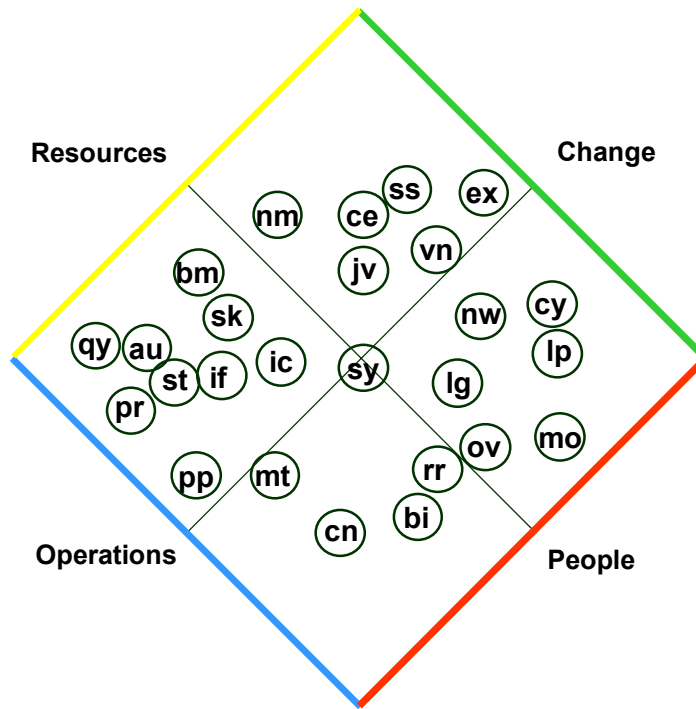


Figure 1. Landmarks on the innovation landscape: the relative positions of the landmarks are derived from their importance/relevance in terms of each of the four strategic dimensions.

3.1 The Audit

In accordance with other innovation audits (Tang, 1999; Chiesa *et al.*, 1996), the strength of enablers are measured by way of a number of statements which have been formulated for interpretation in terms of any type of innovation, ranging from technical to administrative. These are scored on 5-point Likert scales, according to respondents' personal perceptions of their work environment.

The audit consists of three parts:

1. *Performance audit.* This measures the strengths and weaknesses of each of the innovation landmarks highlighted in Table 1. Its purpose is to benchmark the effectiveness of the innovation process of an organization, or individual business units.
2. *Importance audit.* This audit determines the similarities and differences in the strategic importance of enablers in certain functions or operational environments in an organization. This data is critical to characterizing and modeling the nature and type of innovation in different environments within the organization.
3. *Thinking styles.* Since innovation is characterized by a multitude of diverse processes and methodologies, it is of cardinal importance for teamwork and organizational performance that employees' thinking styles and behaviour, as far as practically possible, are aligned with their particular functions. On the other hand, there must also be sufficient diversity in order to stimulate creativity and prevent group-think - an operational department crammed with thinkers will not be successful; however, having only doers could mean that many opportunities are not realized and exploited. For the

purpose of determining the alignment of thinking styles with organizational strategy, we are using an adaptation of the Belbin team role model (Belbin, 1993). However, this part falls outside the scope of the current paper.

In accordance with survey design guidelines set out by the OECD's Oslo Manual, a subject approach is followed. This means that the measurement is based upon the innovative behaviour and activities of the enterprise as a whole, and not on the number and characteristics of individual innovations. The audit is implemented as a set of web-based questionnaires, accessed via the audit homepage www.profiler.sun.ac.za. Typical response times range from 30 to 40 minutes. Scores are logged automatically by the host server; in this way data is transferred effectively, whilst the confidentiality of the information is also protected.

3.2 Strategy

Since no organization has the resources to constantly innovate in every area of business, it is imperative that it identifies the type of innovation it should pursue, and leverage the enablers of these innovations strategically. Thus, the purpose of an innovation landscape is to identify alignment between an organization's performance (enabler strengths) and the particular innovation strategy that it is following. Since this innovation strategy is directly determined by an organization's customer strategy and the environment it operates in, it is insightful to explore the similarities between the contexts in which PSOs and private sector organizations innovate. Treacy & Wiersema (1995) define the following generic customer strategies that may serve as a point of departure in classifying and characterizing different organizations and the contexts in which they innovate:

- *Product Leadership (PL)* - organizations that push products into the realm of the unknown, the untried, or the highly desirable, e.g. Sony and Intel.
- *Operational Excellence (OE)* – organizations that deliver a combination of quality, price, and ease of purchase that no one else can match, e.g. McDonalds and Dell.
- *Customer Intimacy (CI)* – organizations that build bonds with customers; know the people they sell to and the products and services they need, e.g. Home Depot and Mobil.

In this typology of organizations, it may be argued that PSOs most closely resemble operationally excellent organizations: they do not need to be at the leading edge of technology and performance; neither is it their core business to tailor their services and products to the needs of each individual citizen. PSOs and operationally excellent organizations exhibit the following similarities:

- *Focus on efficiency and cost-effective operation.* Whether PSOs are driven to be efficient by stringent budget constraints, or operationally excellent organizations view efficiency as the cornerstone for maintaining maximum profit margins, this type of organization must continually ensure that its processes and operations are up to standard with best practices. Thus, these organizations need to realize the importance of benchmarking and auditing for identifying those areas that are in need of renewal: in this way innovation is driven strategically. Quality management and continuous improvement techniques should be in place to serve as a platform to support incremental innovation and improvements in efficiency.

- *Predominance of process innovation.* Since both PSOs and operationally excellent organizations are characterized by high degrees of planning and procedures (moving along the right channels), innovation is mostly focused on how these may be improved or streamlined. An important enabler in this regard is systems and tools, which include Employee Suggestion Systems, tools for sharing of ideas and concepts (for example, over an intranet) and knowledge databases (which ties in with information and communication). These enablers not only contribute significantly to the generation of new ideas, but also streamline the process of innovation, i.e. the implementation and exploitation of a concept from one unit/department to the other. It is, however, important to be reminded of the fact that process improvement need not only encompass incremental innovation: in some cases radical innovation may be needed. In this case, enablers such as creativity, diversity and motivation and challenge need to be leveraged within the organization. However, due to their comparatively high levels of bureaucracy and adversity to risk, PSOs are primarily concerned with innovation that is geared at reformulating existing outcomes and systems. Hence the greater focus on incremental process innovation and the enablers thereof.
- *Providing a product/service that is easily accessible.* At present, the most important issue in public sector innovation is that of effective service-delivery (illustrated by the move toward citizen-centered service, as mentioned previously): PSOs are aiming to equal the high levels of service and efficiency of product delivery that is the mainstay of operationally excellent organizations. This drive not only aims to streamline activities according to client (citizen) needs, but also seeks to establish the public sector as a valuable source of information and resources to the public. In this regard, it is critical that the public sector remain aware of the needs of the public: this is accomplished via intimate networks with citizens and citizen response surveys. Via these mechanisms, the organization continually sources new ideas for service innovation.

In summary, organizations need to align their capabilities with the strategy they want to follow, i.e. strategically critical enablers must be identified and leveraged. With specific reference to the map of the innovation landscape, it has been shown that the capacities of PSOs and operationally excellent organizations to innovate are heavily dependent on those enablers of innovation that have a predominantly Operational and Resource focus (as indicated in Figure 1). It is thus critical that Operationally Excellent organizations - and PSOs - develop strategic strengths in this domain in order to support their business focus and innovation. This principle is illustrated in the following section.

4. APPLICATION OF THE MAP

The innovation landscape methodology has been applied in a number of private sector organizations in the Chemicals as well as the Mining & Metallurgy industries of South Africa. These include a world leader in the production of platinum, a world-class producer of synthetic fuels, and an international mining giant specializing in iron and heavy metals. The results from these organizations will be used to illustrate how innovation landscapes may be interpreted and how they serve as a visual tool for gauging the degree of strategic alignment of competences within the organization. Strategic alignment may be defined in terms of:

1. The correlation between respondents' Performance and Importance scores - this is an indication of respondents' satisfaction with the extent to which strategic landmarks are being supported in the organization.
2. The degree to which landmarks are aligned to support a particular innovation strategy, as described earlier.

4.1 Importance vs Performance scores

In identifying the extent to which strategic landmarks are being supported in the organization, it is important to identify those landmarks that are deemed to be important (i.e. have high Importance scores), but have low Performance scores. Conversely, landmarks that exhibit low Importance and high Performance scores also need to be considered, since these indicate focus in the wrong areas. Using both Performance and Importance scores thus allows for the identification of so-called strategically 'mismatched' landmarks. For this purpose, P/I-ratios are used to generate landscapes: landmarks that are strategically deficient are portrayed as valleys on the landscape, while those that are over-focused show up as peaks. If Performance and Importance scores are generally well matched, the landscape has a smooth appearance; if, however, Performance and Importance scores are not well matched, the landscape is characterized by patches. Figures 2(c) and 3(c) represent landscapes of mismatched and well-matched Performance and Importance scores, Figure 3(c) having a considerably smoother appearance than Figure 2(c).

In viewing the landscapes, it is helpful to note that borders are typically assigned a value of 3 (except when using P/I-ratios, in which case the border is assigned the average value of the ratios used in the landscape), which corresponds to a neutral/average value on the Likert-scale in the audit. In this manner, peaks and valleys denote above-average and below-average scores, respectively. Since the Matlab-based algorithm used for generation of the landscapes interpolates between peaks, valleys and the border of the landscape, it is possible that landscapes may exhibit areas of high performance where there are actually no associated landmarks as per Figure 1. This is simply an effect resulting from the smoothing/interpolation between landmarks and the border of the landscape.

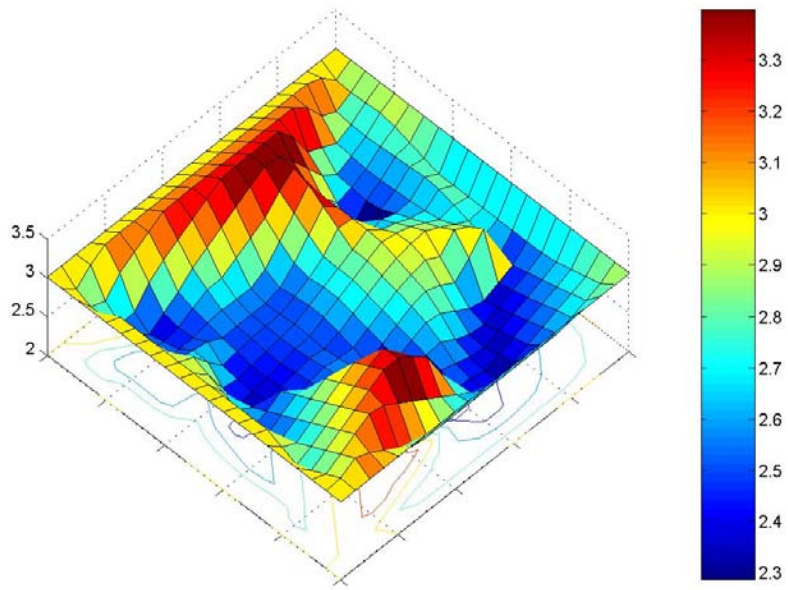


Figure 2(a) Performance landscape - Organization A.

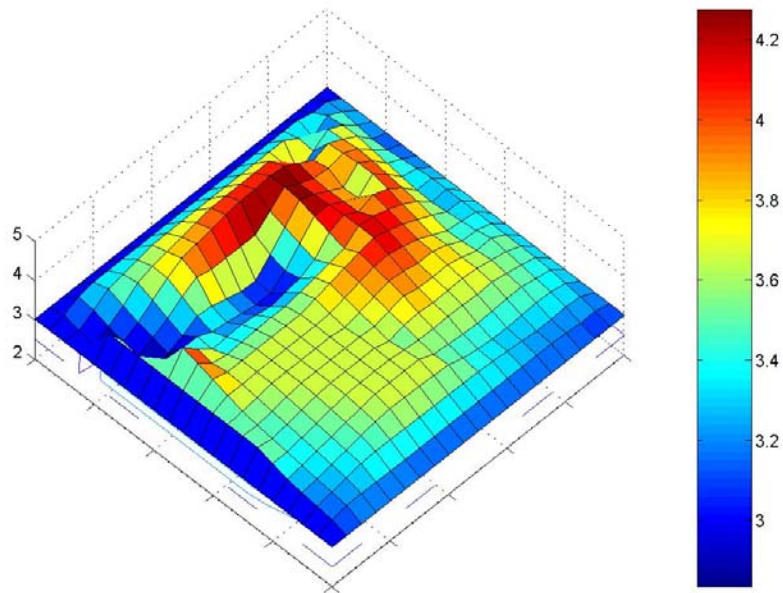


Figure 2(b) Importance landscape - Organization A.

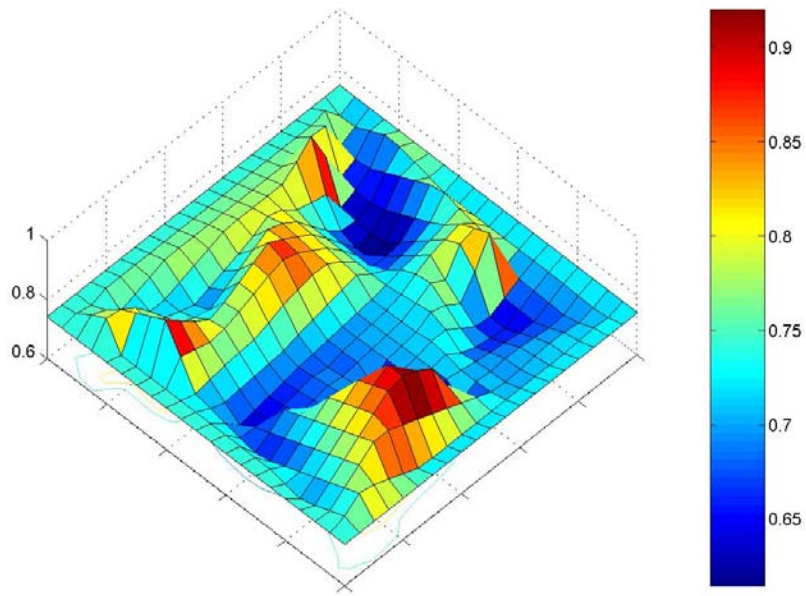


Figure 2(c) P/I landscape - Organization A.

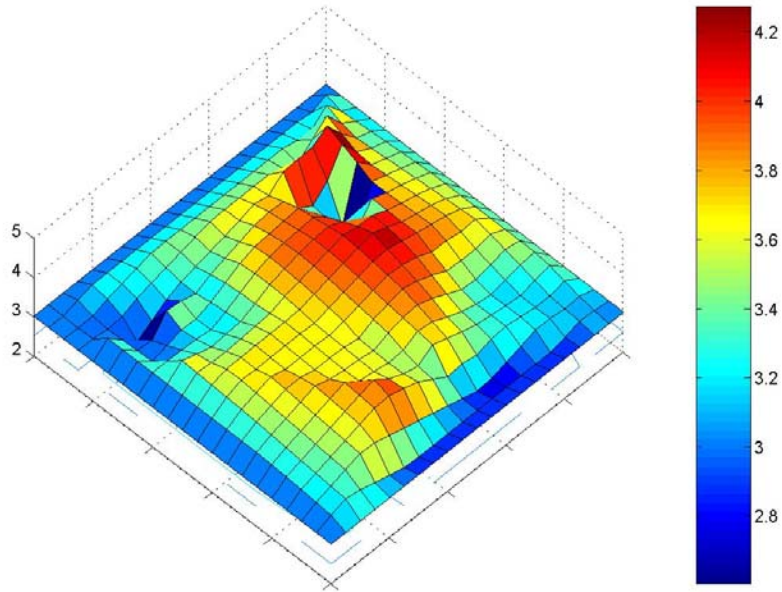


Figure 3(a) Performance landscape - Organization B.

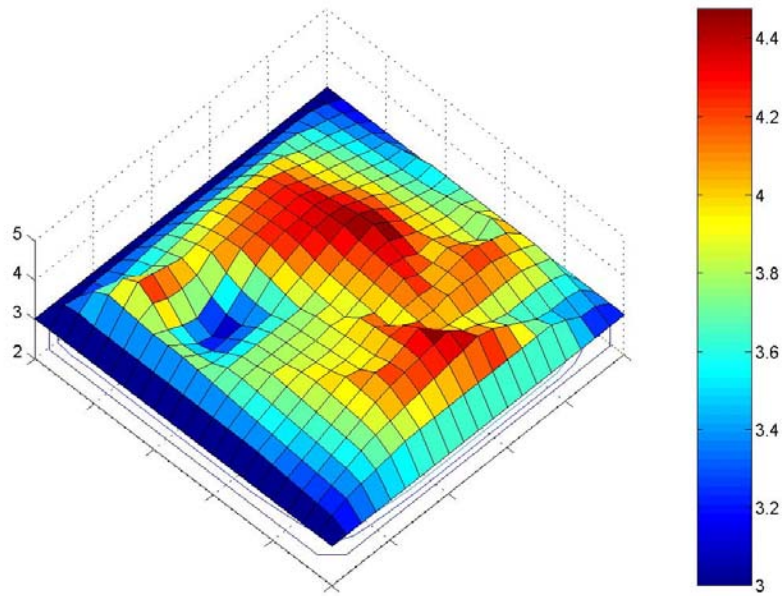


Figure 3(b) Importance landscape - Organization B.

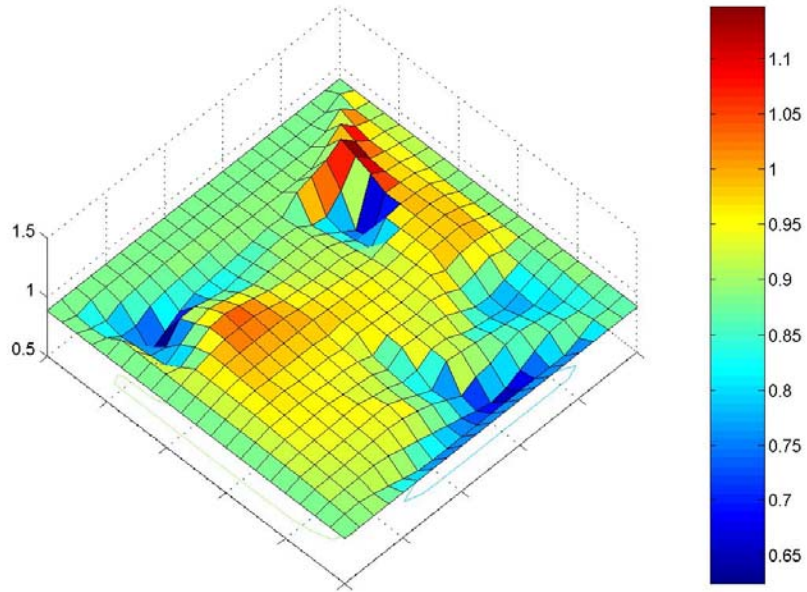


Figure 3(c) P/I landscape - Organization B.

4.2 Alignment with strategic directions

Whereas landscapes of P/I-ratios show up mismatches between the relative performance and importance of innovation landmarks, they do not give an indication of whether the organization's strengths are well aligned with its particular innovation strategy. Strategic alignment is achieved when an organization's innovation landscape reflects high performance in those areas characterized by landmarks that need to be leveraged in support of a particular type of innovation. In the interests of simplicity, these areas are defined in terms of the organization's strategic business directions (for example, is the organization geared toward constant change with a focus on radical innovation, or does it rather rely on steady and systematic incremental improvement of existing processes and systems). To illustrate this concept, Performance landscapes for the three organizations (Figures 2(a), 3(a) and 4) are compared.

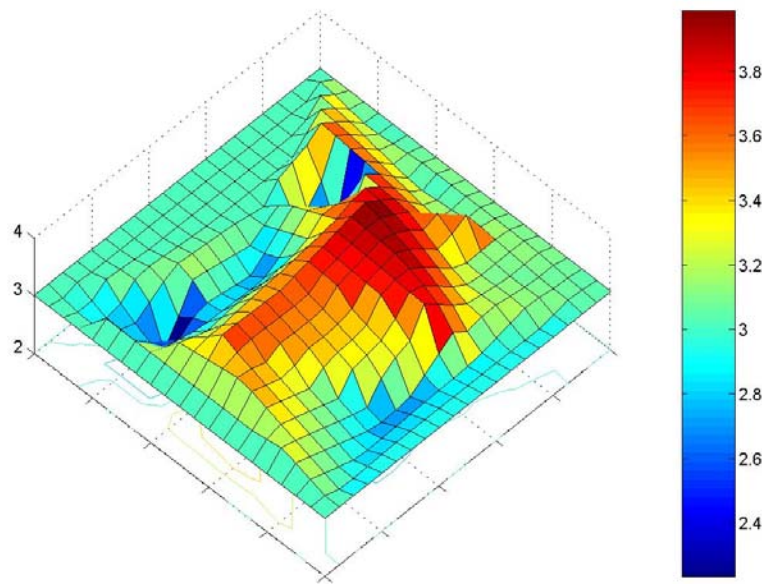


Figure 4 Performance landscape - Organization C.

The landscapes shown have all been generated from data representative of the Production and Operational environments (mining, commodity production, refining etc.) of the organizations mentioned at the start of this section. Since the environments in which these business units operate should theoretically echo those of operationally excellent organizations, the landscapes should display significant strengths in the Operational and Resource domains, as illustrated in the previous section. However, it must be kept in mind that the innovation landscape may also exhibit strengths in other domains: while these landmarks may not be critical to the organization's business focus or innovation strategy, they do act as valuable supports of other (secondary) areas of focus in the organization.

In a comparison of Figures 2(a), 3(a) and 4, it is evident that innovation landscapes facilitate quick and easy conclusions regarding the strategic alignment of landmarks in an organization: although none of the organizations exhibit strengths in both the Operational and Resource

domains, it is obvious that Organization A is dominant in the Resource domain (mainly due to strengths in benchmarking and the identification of new markets), while lacking in the Operational domain. The converse is true for Organization C. In each case it is easy to identify those enablers that need to be leveraged for better strategic alignment, with the help of Figure 1. For example, each of the landscapes exhibit prominent valleys in the Resources-Operations corner: this immediately indicates poorly leveraged enablers of quality and auditing.

It is interesting to note the similarities and differences between the landscapes for Organizations B and C:

- *Strengths in the Change domain* – both organizations exhibit significant strengths in the Change domain (i.e. perceived strengths in enablers such as creativity, learning and growth, vision and networking). This can most probably be attributed to the fact that in each of these organizations, the Production and Operations sections are closely linked to and supported by in-house R&D facilities. Continuous incremental innovation and process improvement are therefore supported by a long-term vision for radical innovation.
- *Customer networks* – having discussed the importance of maintaining intimate customer networks in support of service innovation, it is immediately apparent from the landscapes that Organization B leverages this enabler better than Organization C. This may be attributed to the fact that Organization B is being forced to focus on this aspect of business in a market that is slowly moving from commodity to speciality products.

Based on the above comments, it is evident how innovation landscapes can be instrumental in understanding and visualising the strategic alignment of enablers of innovation in different organizations, be it in the private or the public sector.

5. CONCLUSIONS

To an ever-increasing extent, public sector organizations are being subjected to the same pressures as those experienced by the private sector a number of years ago. Driven by tighter financial constraints and increased public demand for improved service, PSOs are forced to approach their business in new and innovative ways. This innovation, perhaps even more so than in the private sector, cannot happen indiscriminately - due to limited resources it needs to be driven strategically. The enablers that are critical to supporting a particular strategy need to be identified and leveraged in order to provide real value to the customer and other stakeholders.

This paper described a tool and methodology to assist strategists and managers in achieving better Returns-on-Innovation. In this tool, a topographical map of the innovation landscape, key landmarks (enablers of innovation) are positioned according to the way in which they support a particular strategy. The map also provides a measure of the topography of the landscape in that it determines the relative strengths of landmarks by means of an audit. Therefore, a major implication of this work is that the innovation audit is linked explicitly to the organization's value proposition.

While the tool has been applied to date only within the private sector, it was pointed out that the enablers for innovation do not differ significantly from those in the public sector. For this

reason, the audit and map could feasibly also be applied in the public sector. However, while only minor modifications could be required, it is important that major differences in the respective business contexts, such as risk-taking, autonomy of decision-making, and availability of resources, be borne in mind.

The application of the methodology was illustrated by examples from our work in the private sector. It was shown how important observations regarding the strategic alignment of the landmarks of innovation could be made – these would enable appropriate action plans to be developed. An added feature of the methodology is the fact that it facilitates quick and easy interpretation of the body of data collected in an audit.

About the Authors:

Ross

Anton Kleingeld holds B.Eng., M.Sc.Eng and PhD (Eng.) degrees in Chemical Engineering from the University of Stellenbosch, South Africa. He obtained his PhD (April 2003) in the field of management of innovation, specifically on the relative importance of enablers of innovation for different types of innovation, in the context of the South African Chemicals and Mining and Metallurgy Industries. He is currently employed by SASOL Ltd. as process engineer. His academic interests include the strategic management of innovation and the role of contingency modeling therein.

Professor Leon Lorenzen is Associate Dean (Research Development and International Collaboration) of the Faculty of Engineering, as well as Professor and Chairman of the Department of Chemical Engineering at the University of Stellenbosch, South Africa. He is also currently the Director of the Centre for Process Engineering at the same University. He joined the Department in 1990 after several years of industrial experience in the gold and uranium industries, as well as two years experience in the aerospace industry. He holds a B.Eng. in Chemical Engineering (1982), an M.Eng. (1985) and a Ph.D. (Eng) in Metallurgical Engineering (1993) from the University of Stellenbosch. He also completed a postgraduate diploma in Systems Engineering (1989) and an Executive Development Programme (1999) from the University's Business School. Amongst others, Prof Lorenzen has authored and co-authored 52 papers in international journals, 2 patents, 1 book chapter, as well as over 70 refereed papers in proceedings of international symposia. His research interests include all aspects of hydrometallurgy, especially leaching, waste management especially integrated management systems and water research, i.e. processing and treatment, as well as reactive processes using membranes, resins and activated carbon. Prof Lorenzen teaches environmental engineering, electrochemical engineering, mineral processing, and project and technology management at an undergraduate level.

REFERENCES

Belbin, R.M. (1993). *Team Roles at Work*. Heinemann.

Beukman, C.P. and Harfield, T. (1998). 'Sustainable development: three innovative models of public management'. *The Innovation Journal*, **3**.

Blythe, D.M. and Marson, D.B. (1999). *Good Practices in Citizen-Centred Service* [online]. <http://www.ccmd-ccg.gc.ca/pdfs/goodpr.pdf>

Borins, S. (2001). *Professor Sandford Borins on Public Sector Innovation* [online]. <http://www.pserc.gov.bc.ca/erp/content/bulletins/orgimprv/oirecent/oi000039.html>

Buckler, S.A. and Zien, K.A. (1996). 'From Experience: The Spirituality of Innovation: Learning from stories'. *Journal of Product Innovation Management*, **13**, 391 – 405.

Chiesa, V., Coughlan, P. and Voss, C.A. (1996). 'Development of a Technical Innovation Audit'. *Journal of Product Innovation Management*, **13**, 105 – 136.

Cooper, R.G. and Kleinschmidt, E.J. (1995). 'Benchmarking the Firm's Critical Success Factors in New Product Development'. *Journal of Product Innovation Management*, **12**, 374 – 391.

Cooper, R.G. and Kleinschmidt, E.J. (1996). 'Winning Businesses in Product Development: The Critical Success Factors'. *Research Technology Management*, July-August, 18 – 29.

Damanpour, F. and Gopalakrishnan, S. (1994). 'Patterns of generation and adoption of innovation in organizations: Contingency models of innovation attributes'. *Journal of Engineering and Technology Management*, **11**, 95 - 116.

Damanpour, F. and Gopalakrishnan, S. (1998). 'Theories of organizational structure and innovation adoption: the role of environmental change'. *Journal of Engineering and Technology Management*, **15**, 1- 24.

Deloitte Consulting (2001). *e-Government's Next Generation: Transforming the Government Enterprise Through Customer Service* [online]. <http://www.dc.com/obx/pages.php?Name=PubSecResearch>

Frohman, A.L. (1999). 'Personal Initiative Sparks Innovation'. *Research Technology Management*, May-June, 32 - 38.

Glor, E. (1997). 'Strategies for creating an innovative public sector'. *The Innovation Journal*, **2**.

Glor, E. (1998). 'What Do We Know About Enhancing Creativity and Innovation? A Review of Literature'. *The Innovation Journal*, **3**.

Glor, E. (2001). 'Key Factors Influencing Innovation In Government'. *The Innovation Journal*, **6**.

Lester, D.H. (1998). 'Critical Success Factors for New Product Development'. *Research Technology Management*, January-February, 36 - 43.

Livesay, H.C., Lux, D.S. and Brown, M.A. (1996). 'Human factors and the innovation process'. *Technovation*, **16**(4), 173 – 186

Loucks, K.E. and Robertson, M.B. (1999). 'Innovation Case Study: Empowerment And Workforce Adjustment In The Niagara Area Office Of Human Resources Development Canada'. *The Innovation Journal*, **4**.

Lynch, K. (1999). 'Innovation and Risk-taking: An Industry Canada Perspective'. *The Innovation Journal*, **4**.

Lynn, G.S., Mazzuca, M., Morone, J.G. and Paulson, A.S. (1998). 'Learning is the Critical Success Factor in Developing Truly New Products'. *Research Technology Management*, May-June, 45 - 51.

Lyonnais, D. and Houle-Rutherford, D. (1996). 'A Formula for Innovation in Government'. *The Innovation Journal*, **1**.

Manley, K. (2001). The challenges faced by public sector innovators [online]. <http://www.tti2001.qut.edu.au/docs/MANLEY.ppt>

Macpherson, M. (2001). *Performance Excellence Principles – Drivers of Innovation in Public Sector Organizations* [online]. www.baldrigeplus.com/Conferences.pdf

Markham, S.K. and Griffin, A. (1998). 'The Breakfast of Champions: Associations between Champions and Product Development Environments, Practices and Performance'. *Journal of Product Innovation Management*, **15**, 436 - 454.

Nagel, S. (2001). 'Creativity and Policy Studies'. *The Innovation Journal*, **6**.

Porter, M.E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*, The Free Press, New York.

Schmidt, F. and Strickland, T. (1998) *Client Satisfaction Surveying: A Manager's Guide* [online]. http://www.ccmd-ccg.gc.ca/pdfs/guide_e.pdf

Subramanian, A. (1996). 'Innovativeness: Redefining the concept'. *Journal of Engineering and Technology Management*, **13**, 223 - 243.

Tang, H.K. (1999). 'An inventory of organizational innovativeness'. *Technovation*, **19**, 41 - 51.

Treacy, M. and Wiersema, F. (1995). *The Discipline of Market Leaders*, Addison Wesley.