

Review of Business Process Improvement Methodologies in Public Services

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May 2010



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Executive Executive Summary Summary



This Executive Summary draws conclusions from a literature review of business process improvement methodologies, in order to consider the:

- Successes and shortcomings of applying business process improvement methodologies within a public sector and/or service environment.
- Ways of determining which business process improvement approaches are suitable in a given environment.
- Practicalities associated with using these methodologies.
- Suggested metrics for measuring improvement.
- Sustainability of any improvements realised over the longer term.

This summary will respond to these aims by answering a set of questions. It will also reflect on where some of the gaps are within the literature, knowledge and understanding around business process improvement methodologies. It will also set out the limitations of the review as well as give indications where future development of the concepts should be focused.

The Status of Business Process Improvement Methodologies in the Public Sector

What is Business Process Improvement Methodology in the Public Sector and, why is it being implemented?

Business process improvement methodologies within the public sector include the application of **Lean**, **Six Sigma** and **BPR** together with **Kaizen**, **TQM** and **Systems Thinking**. A few organisations have attempted to implement Theory of Constraints but this is not widespread. Many of the approaches have their roots in the Toyota Production System and the ideas of Deming. Of these approaches Lean currently appears to be the greatest uptake particularly in Healthcare. Some authors (e.g. Proudlove et al., 2008) have argued that Lean has had the most application because of its participative nature.

In a review of the literature on Lean carried out on behalf of the Scottish Executive in 2006 the authors concluded that *“There is little doubt of the applicability of Lean to the public sector... many of the processes and services within the public sector can gain greater efficiency by considering and implementing aspects of Lean. However, there is still little evidence of the complete Lean philosophy being applied in the public sector”* (Radnor et al., 2006). From the evidence presented in this review this opinion has not altered. Lean, and to a lesser degree Six Sigma, is still applicable and very few organisations have implemented the complete philosophy within the UK. It could be argued that organisations such as the Royal Bolton NHS Trust and HM Revenues and Customs (HMRC) are the closest of any public service organisation to date in implementing the complete Lean philosophy. Although as the HMRC evaluation concludes *“HMRC is not a Lean organisation”* (Radnor and Bucci, 2007).

In terms of the drivers for business process improvement, the focus appears to be on the need to reduce cost, develop efficient processes and respond to policy. Although increased customer satisfaction is an outcome, this was not explicitly stated as a driver in the evidence within this review. Although, it could be argued it is a consequence of responding to the other drivers. The concept of value is important and is mainly defined by the customer, consumer or patient. However, within public sector organisations, other forms of ‘value’ may well exist which need to be included within the processes and system. These include adherence to policy, laws and equity which may not be so prevalent within private sector organisations. Therefore, maybe the recognition of ‘value’ and drivers towards it should be the focus, rather than just the customer.

What do Business Process Improvement Methodologies consist of and where are they being applied?

Various applications of Lean, Six Sigma, BPR and Kaizen have been reported across a number of public services. Many authors recognised that business process improvement methodologies are based on established tools and techniques, and therefore could be argued to merely draw on *“any good practice of process/operations improvement that allows reduction of waste, improvement of flow and better concept of customer and process view”* (Radnor et al., 2006). It could then also be argued that the implementation of Lean, Six Sigma or BPR is not new, as basically their fundamental ideas lie in continuous improvement, elimination of waste, process flow and Systems Thinking developed throughout the organisation which has been evident in other forms including Total Quality Management.

What is probably new within public services is not any single element but the combination of elements. In particular, an important difference for public services is Systems Thinking which means considering and managing ‘value’ across, and between, organisations. This no longer implies optimising one part of the process but the whole system. To do this in service organisations people, not machines are critical as they are an inherent part of the system delivering the service.

Of the over 165 sources identified and included in this literature review 51% focused on Lean and 35% considered the Health Service indicating that Health is the area of public services where there are currently the most reported applications of business process improvement methodologies, particularly Lean. Various approaches and tools have been used including Lean production, flow, rapid improvement events (RIEs), process and value stream mapping, standardising systems and root cause analysis in hospitals to improve emergency care services, intensive care units and operating units and to reduce waiting times. There was growing evidence of Lean and Six Sigma being applied to others areas of public services, particularly Central Government, Local Government, Police and Justice and, growing interest from Fire and Rescue Service and Education.

Typical tools and techniques associated with business process improvement methodology include Rapid Improvement Events (RIEs) (sometimes referred to as Kaizen events), process mapping, 5S, value stream mapping, visual management and the Define Measures, Analyse, Improve and Control (DMAIC) methodology for Six Sigma. It could be argued that the tools within the methodologies are used for three reasons. These are:

Assessment: To assess the processes at organisational level e.g. value stream mapping, process mapping.

Improvement: Tools implemented and used to support and improve processes e.g. RIEs, 5S, structured problem solving.

Monitoring: To measure and monitor the impact of the processes and their improvement e.g. control charts, visual management, benchmarking.

Within the review evidence was found that tools were used for all the reasons although the distinction given above was not always made. Also, although many of the examples given of assessment tools focused at organisational or departmental level, the improvement and monitoring tools usually focused at individual processes rather than system or organisation level.

What are the important factors when implementing Business Process Improvement Methodologies?

When implementing business process improvement methodologies in the public sector factors in terms of organisational readiness, success and barriers should be considered. In terms of organisational readiness, this includes elements such as having a process view, developing a culture focused on improvement and, an understanding of the customer and the ‘value’ within the organisation. These elements of readiness are critical as the foundation for process improvement as they provide a basis which the tools can be applied. Without these elements it may be easy for people to go back to the ‘way it was before’ and so not sustain any improvements made.

The key success factor is strong leadership and visible support from management. Other success factors include an effective communication strategy, appropriate training and development, giving resource and time for the improvements to take place and, using external expertise and support. Within public services the evidence indicates a lack of clear communication regarding the process improvement programme can lead to anxiety and concern amongst the staff and also a perception that the approach is not relevant for their role and organisation. Also there was evidence of a reluctance to use external support and expertise with senior managers in public services feeling that other people would not understand their organisation. This illustrates that many managers view their organisation not as a system but as an entity which can only learn from a similar form (e.g. another local authority).

Many of the barriers for process improvement were the reverse of the success factors e.g. lack of leadership, poor communication strategy, no sense of urgency, lack of methodology, little monitoring and evaluation of outcome, little consultation with stakeholders, poor engagement with employees and, under resourced implementation teams. However, another barrier noted was the command and control structures prevalent within public sector organisations. The environment, often driven by policy and spending reviews, means that the requirement to engage with process improvement and other concepts is driven from management. This means that staff within public services are management facing and not customer facing, therefore responding to the management requirements rather than the customer. Changing this view and structure may be difficult, and probably not completely possible, but in order for process improvement methodologies to become more holistic and embedded within public service organisations, it is important that a structure is found which can support both policy and customer needs.

What has been the impact of implementing Business Process Improvement Methodologies in the Public Sector?

Where business process improvement methodologies have been implemented focused around processes and departments, the evidence indicates significant impact related to quality, cost and time and even satisfaction of both staff and customers. For example, HMRC claim that the introduction of Lean has resulted in impacts of improved quality, productivity and lead time. Many of the impacts reported and noted in organisations identified within the literature review are presented in terms of reduction of (processing or waiting) time, increase in quality through a reduction of errors or 'failure demand', reduction in costs (through less resource), increased employee motivation and satisfaction (particularly related to RIEs) and increased customer satisfaction.

However, the evidence presented for the whole organisation or, in terms of costs and benefits across the complete business improvement implementation was not always robust. Few, if any, reported cases presented a clear performance measurement and monitoring framework for the whole process improvement programme or in terms of cost benefit for the organisation. Currently the Royal Bolton Hospital Trust, DWP and HMRC are developing ways to track and monitor benefit realisations but are finding challenges due to the complexity of capturing the impact of the process improvements but are recognising that it could be an issue if they need to justify 'value for money'.

There was evidence to suggest that the reason for the dramatic results within public services is that previously little attention was given towards processes, instead focusing on activities and tasks. By considering the process view for the first time it is 'easier' to identify and remove forms of waste. This has meant that for many public sector organisations the focus of Lean and Six Sigma has been the Rapid Improvement Events/workshops. Although this approach is a good starting point, due to the level of impact they bring, their use needs to be considered as part of an overall long term methodology. The real test would come once the 'low hanging fruit' has been picked – then the other principles or tools of business process improvement will become important and relevant and, maybe more difficult to apply. An example of this is the concept of flow which relies upon an understanding of demand and variation. The evidence presented illustrates that currently there is still little understanding of this within public services. Although if flow and the other principles of Lean are embraced, the impact could be considerable.

How are Business Process Improvement Methodologies being sustained?

Many of the factors reported in the literature relating to sustainability were similar to those presented under enablers, readiness and success factors e.g. relevant training of staff, management commitment and effective monitoring of outcomes and impact. What is important regarding sustainability is the realisation that the process improvement methodology is a long term programme and not a short term fix. Along the journey many tools and techniques can be used, some which result in quick impacts but others need to be developed over time e.g. leadership style and developing a culture which seeks and addresses areas for improvement. Taking a holistic approach, as was done within HMRC, DWP and Royal Bolton Hospital, means that over a period of time (up to 7 years) the methodologies can become embedded.

It is also possible to have a programme which uses a combined approach e.g. both Lean and Six Sigma but the statistical tools and language within Six Sigma need to be carefully introduced as not to alienate its potential impact. However, regarding the engagement of professionals in Healthcare, Higher Education, Justice and Government the use of more scientific and statistical tools may allow higher engagement.

The evidence indicated that Lean, and so other process improvement methodologies, should be adapted rather adopted in public services suggesting that they should first engage with the principles (of customer and process view, flow, reduction of waste) through the use of simple tools and techniques. Also, rather than aim for standardised processes, as is the case for manufacturing organisations, service organisations should focus on creating robust stable processes which can deliver variety through developing customisation from a standard offering.

Service characteristics are not an excuse for avoiding manufacturing methodologies as a means of efficiency gains and, as the evidence indicated any organisation can gain substantial benefits including improved quality, reduction in costs and increased responsiveness from implementing some new practices focused around process improvements.

Reflections, Gaps and Future Direction for Business Process Improvement Methodologies in the Public Sector

The evidence presented through the literature, including evaluation reports, indicates that Lean has been embraced to a wider degree than Six Sigma across the public services especially since 2005, with Healthcare, Central Government and Local Government organisations embracing and implementing 'Lean'. The evidence indicates that Lean has had significant impact but as previously mentioned it has achieved this through focus on the principles through using simple tools and techniques rather than applied approaches. Although the principles are on one level simplistic, there is still little evidence that public sectors organisations have, or are, completely embracing them. Within the literature methodologies, frameworks, tools, success factors, barriers and case study evidence is presented which can be drawn upon to inform when, what and how to implement Lean, Six Sigma and BPR in public services.

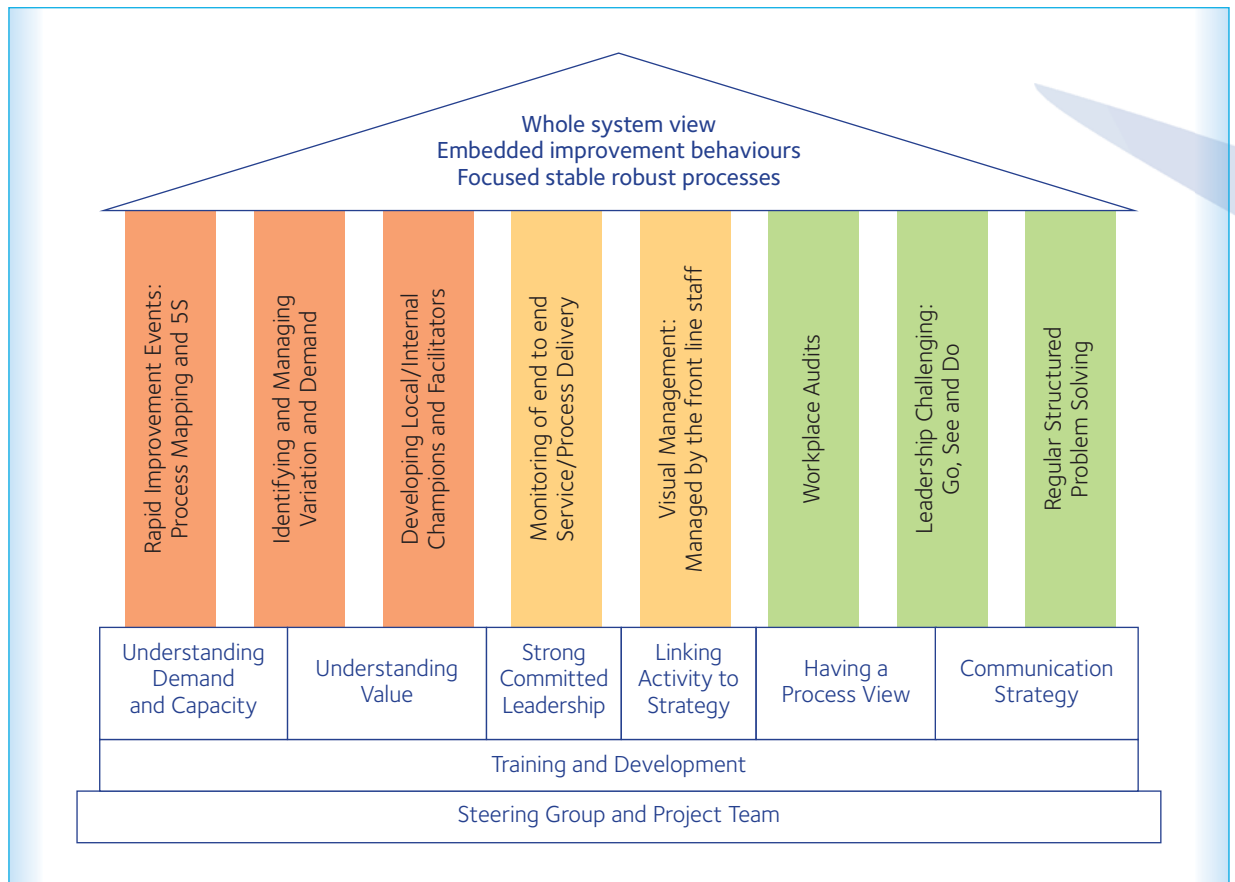
The review considered over 120 publications in detail as well as another 50 publications in brief. The publications chosen focused on the selected process improvement methodologies as well being relevant for public services. The majority of the publications were articles rather than books although summaries and reviews of books were also included. Possible limitations of the review maybe that some books were not read in full and that some methodologies, e.g. Theory of Constraints, were not considered. However, when reading publications associated with the later, it became apparent that very few new points were presented leading to the conclusion that the relevant detail had been accessed. It was noted by many academic and practitioner experts that the evaluations carried out on behalf of the Scottish Executive and HMRC were significant pieces of research on the application of Lean in Public Services.

The analysis allowed a number of issues, challenges or gaps to be identified which need to be addressed for the continuing development and implementation of business process improvement methodologies in the public sector:

- The drivers for implementation focus around reduction of costs and improved quality and not principally on customer needs and satisfaction. However, understanding the customer and what 'value' within an organisation is the first principle of Lean and probably needs clearly definition.
- The majority of implementations have been within Healthcare (UK and USA) and Government (Central and Local) within the UK. A full investigation into whether they have been applied in other public services is needed as well as a greater understanding of the impact within other public services where their application is growing.
- Elements of readiness, success and barriers are presented interchangeably but for public service there is a real need to emphasise the need for organisational readiness. Having a basis in understanding the process, customer/value and variation along with engaging staff and recognition of the timescale to fully implement the concepts is critical in ensuring both achievement of the possible improvement and sustainability.
- Recognition and development of ways that effective communication can be achieved within the organisation and, mechanisms for external support and expertise to be accessed are two areas which are needed to support successful implementation.
- Finding ways for public sector managers to view their organisations as a system and not a series of functional processes or activities. This means supporting a structure which is 'value facing' rather than 'management facing'. This may mean understanding processes not just across functional but organisational boundaries.
- A better understanding of variety, variation and variability of demand is needed so that resources and capacity can be designed or encouraged to respond to them by designing processes around different types of 'customer' groups and demands.
- Clearer performance measurement and monitoring systems along with supportive auditing tools should be developed which allow organisations not only to justify their level of investment in the methodologies but to support continual effective progress.

Reflecting on the findings within the review it appears that in order to truly develop and support process improvement within public services the approach needs to be viewed as consisting of both technical and cultural aspects with factors needing to be developed over time, i.e. a full understanding of the organisational processes, customer requirements or 'value', levels and types of demand, leadership style and, a culture which seeks and addresses areas for improvement. Figure 1 represents a House of Lean which incorporate these factors as strong foundation to ensure that a organisation is ready to engage with, or can enable, Lean. These can be defined as factors of 'organisational readiness'. These factors themselves should be supported by ongoing training and development and a steering group and project team, as the bedrock and foundations of developing Lean in Public Services. The tools and techniques are represented as the pillars of the house. The red assessment and improvement tools should be implemented first as these achieve some quick wins, clear focus and *engagement*. The orange pillars are focused on the monitoring tools to allow the impact of the activity to be identified and *established*. The green pillars are tools which will allow Lean to become *embedded* in the day to day processes and service delivery. The House integrates the technical and culture aspects of Lean throughout with them feeding into each other in order to achieve a whole process, value chain or system view, embedded improvement behaviours and stable robust processes.

Figure 1: House of Lean for Public Services



But, should public sector organisations be investing in process improvement methodologies? The answer is yes as this review and previous experience clearly indicates that Lean is potentially a good framework for public services as the principles give managers something to ‘hang onto’ with simple tools and techniques to use. However, it needs to be fully understood as a philosophy and seen more than just a policy and a set of tools. Six Sigma can give a clear structured approach and focus on reduction of variation but the statistical language and hunger for data means that its application is probably more difficult. In terms of BPR, this gives a good focus on the process particularly across functional and service boundaries but the focus it requires is too big and difficult to support with current public service structures. As the evidence in the review indicates BPR has been superseded as a process improvement methodology by approaches such as Lean. As for the other approaches (TQM, Benchmarking and Kaizen) they are and, can be used as part of a wider methodology.

Process improvement methodologies give an opportunity to support and help address some of the inefficiencies within public services focused around process and practices. By focusing on value, process and variation through viewing the organisation as a system and understanding the data, it is possible to achieve impact in terms of improved time, cost savings, service quality as well as employee morale and satisfaction – all which support in achieving the requirements of the efficiency agenda. However, public sector leaders and managers need to fully understand what this means, commit and support it and not merely view it as another policy. They must view it not as set of tools but as part of an organisational strategy which can include rapid successes (which help in justifying its use particularly in a changing political environment) that fundamentally consists of a shift in culture, thinking and structure.

Introduction 1



The aim of this report is to outline a review of the existing literature on business process improvement and efficiency enhancing techniques¹. The report presents a summary of the key points from the literature, and draws out conclusions to inform the understanding of such techniques, demonstrate evidence of the effectiveness and applicability of different techniques within different settings.

The review of the available literature focuses approaches such as Lean Thinking, Six Sigma, Business Process Reengineering (BPR), other process improvement techniques and blended approaches such as Lean Six Sigma. These techniques have been used in private sector manufacturing and service organisations for several years and are currently starting to be applied in public sector organisations in order to improve efficiency.

Specifically the literature review will highlight evidence of:

- Successes and shortcomings of applying the techniques within a public sector and/or service environment.
- Ways of determining which approaches are suitable in a given environment.
- Practicalities and costs associated with using these techniques.
- Suggested metrics for measuring improvement.
- Sustainability of any improvements realised over the longer term.

The original extensive literature review was undertaken between November 2007 and March 2008 and has been updated regularly². Data Extraction Sheets (DES) were produced for each publication providing more information on each publication.

The methodology adopted to search for and identify relevant publications for the review is described in detail in a 'Literature Scoping Report' and is summarised in Appendix 1. This report outlined how search strings of words were used across a number of databases in order to identify over 300 relevant publications. This list was then scrutinised to reduce the number to 91. This list was combined with publications identified from previous research, from experts and other sources giving access to over 150 relevant information sources. Finally, during the evaluation and reading stage additional articles were identified and included. In total 165 publications have been considered during this review. These sources are listed in Appendices 2 and 3 (the list of publications used for the review is provided in Appendix 2 and a bibliography of all other publications read in Appendix 3). Also an 'expert panel' was used not only to identify and verify some readings but to give their view on what business process improvement techniques are and how they should be defined, what is needed to support their implementation and how can they be measured. Appendix 4 lists the set of questions sent to the expert panel and the summary of the responses provided them.

¹ The original piece of work which this review is based was a Literature Review on Business Process Improvement Methodologies completed in February 2008 and commissioned by the National Audit Office (NAO).

² I would like to acknowledge the contribution from Giovanni Bucci, AtoZ Business Consultancy and Nicola Burgess, Warwick Business School who carried out some of the work for the original literature review work.

It should be noted that the publications searched for and reviewed were chosen due to their relevance to the public sector. There are publications which refer to the private sector – these are used in order to develop a thorough understanding of the concepts and an awareness of what and how business process improvement methodologies are being applied. Throughout this report both private and public sector examples will be presented with the final section of the report drawing on the evidence to focus particularly on the relevance for public services. From the publications it emerged that the key business process improvement methodologies were Lean, Six Sigma and, to a degree, BPR – this reflects the focus on improvement methodologies over the past 10 years. Therefore, associated methodologies such as Total Quality Management (TQM), Benchmarking, and Kaizen etc. are defined and explained in this report. However, when the success factors and barriers are considered their inclusion becomes less relevant.

Section 2 of the report provides definition of the techniques as derived from the literature and which have been used for this review. Sections 3–8 provide an overview and description of the key points from the literature detailing the implementation of the techniques in manufacturing from the 1980s and also more recently implementations in service and the public sector. These sections also provide information on some of the tools and models that have been developed in order to facilitate implementations and are, by nature, fairly descriptive. There is a strong emphasis on literature in health services, particularly the National Health Service, as it appears to be the main public service within which there have been many business process improvement implementations and also, publications of these implementations. Section 9 reflects on the writings from sections 3–8, as well as any relevant comments from the expert panel, in order to draw out some key findings as well as raise and respond to some questions regarding business process improvement methodologies.



Definitions and Key Principles



The starting point for the review of literature is to define the meaning and basic principles of Business Process Improvement Techniques. For the purposes of this review, Business Process Improvement Techniques focused on Lean, Business Process Reengineering and Six Sigma. The more generic concept of Process Improvement has also been considered in order to cover other relevant aspects of business improvement. This section highlights the definitions of these techniques, as outlined in the literature and lists their key principles.

2.1 Definitions

The definitions used for this literature review are:

“Lean Thinking is specifying value by specific products, identifying the value stream for each product, make value flow without interruptions, let the customer pull value from the producer, and pursue perfection.” (Womack and Jones, 1996)

“Business Process Re engineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed.” (Hammer and Champney, 1993)

“The basic goal of a Six Sigma strategy is to reduce variation within the tolerance or specification limits of a service performance characteristic. In order to improve the quality of a typical service, it is imperative to measure or quantify variation and then develop potential strategies to reduce variation.” (Antony, 2006)

Process improvement was used as a ‘catch all’ phrase that allowed the identification of relevant publications that focused on Total Quality Management, Benchmarking, the EFQM model and ISO 9000.

It should be noted that for the purpose of the literature review the definitions of the business improvement techniques were the ones cited above. However across many of publications definitions vary, but in general all definitions relate to interventions that result in continuous improvement, elimination of non value added activities, better flow of processes and improved quality throughout the organisation.

2.2 Key Principles

2.2.1 Lean Thinking

Lean Thinking has its roots in the Toyota Production System and has been development over time, with Womack and Jones (1990 and 1996a) regarded by most as the originators of the term and its associated principles. Lean is considered to be a radical alternative to the traditional method of mass production and batching principles for optimal efficiency, quality, speed and cost (Holweg, 2007). The five core principles of Lean, based on an underlying assumption that organisations are made up of processes, are (Womack and Jones, 1996; Porter and Barker, 2005; Radnor and Boaden, 2008):

- Specify the value desired by the customer. It is also useful to identify who the real customer is and better understand their requirements, which can be complex.
- Identify the value stream for each product providing that value and challenge all of the wasted steps.
- Make the product flow continuously. Standardising processes around best practice allows them to run more smoothly, freeing up time for creativity and innovation.

- Introduce pull between all steps where continuous flow is impossible. This focuses upon the demand from the customer and triggers events backwards through the value chain. In this way inventory and human activity is linked to customer needs.
- Manage towards perfection so that non-value adding activity will be removed from the value chain and the number of steps and the amount of time and information needed to serve the customer continually falls.

Whilst all five principles are key to the implementation of Lean Thinking, the most important element is argued to be the first element 'specifying and identifying the value'. As Womack and Jones (1996b) stated "*failure to specify value correctly before applying Lean techniques can easily result in providing the wrong product or service in a highly efficient way.*" Also, when defining the 'value stream' Womack and Jones (1996b) point out that there is a "*need to look at three critical activities of business – 'product definition, information management and physical transformation'.*" Young and McClean (2008) provide a discussion of the indeterminate nature of 'value' in a healthcare setting reporting a range of interpretations and perspectives. They define value from the perspective of the 'patient pathway' which refers to the route that a patient will take from the period of entry into the hospital until the patient leaves i.e. to design pathways around the creation of value to the patient at each step rather than considering the range of patient centered activities such as radiology, pathology and ward care for example, as isolated processes or 'functional silos' (Young and McClean, 2008).

Within Lean it is stated that all other activities that do not provide value are a waste and should be eliminated (Hines et al., 2008). Therefore, a crucial element of Lean is the removal of non added value or waste, variability and inflexibility (Bhatia and Drew, 2006). These also have Japanese terms of muda (waste), mura (unevenness) and muri (overburden) (Hines et al., 2008).

Bhatia and Drew (2006) identify those which are of particular relevance to the public sector are:

- Waste; scrap and rework, waiting, inventory, unnecessary motion, unnecessary transport, over production and over processing.
- Variability; examples of which in public services include the variation in gathering evidence for a trial.
- Inflexibility especially with regard to staffing levels being inflexible and the same every day on the assumption that a standard service necessarily offers economies of scale, whereas customer segments require different levels and types of service.

It is important to note that Lean is argued to be a philosophy with some authors suggesting that what organisations need or are creating is '*a Lean lifestyle*' (Hines et al., 2008; Radnor and Bucci, 2007). Also the implementation of Lean is described as '*a journey*' – with the various stages of the implementation being landmarks of the total journey (Bicheno, 2004; Radnor and Bucci, 2007).

2.2.2 Six Sigma

Six Sigma aims to reduce organisational costs and enhancing customer satisfaction through the reduction of defects or service failure. It concentrates on measuring product/service quality, reducing variation, driving process improvements and reducing cost, using a set of statistical and management tools to make improvement leaps (Dedhia, 2005). Six Sigma projects aim to reduce the defect rate to a maximum of 3.44 errors per million exposures (i.e. 0.0000344%) (Harrington, 2005). Although Antony (2006) reminds us that "*the focus of 'Six Sigma' is not on counting the defects in processes, but the number of opportunities within a process that could result in defects.*"

A key focus of the Six Sigma approach is the implementation of 'projects' using a defined methodology called DMAIC (Define, Measure, Analyse, Improve and Control). Other key elements of Six Sigma include (Dedhia, 2005; Anthony, 2007):

- Projects are aligned to strategic objectives and are rapidly completed.
- Within these projects, it integrates the human (teamwork, culture change, motivation, customer focus, etc.) and process (process control, monitoring, analysis and improvement) aspects of improvement.
- That it integrates statistical and non statistical tools of quality improvement in a sequential manner within a problem solving framework.
- There are clearly defined performance measures by which projects are assessed.
- A Belt system which creates a powerful team infrastructure for project implementations.

2.2.3 Lean Six Sigma

Some authors have presented and reported on the concept of 'Lean Six Sigma' which is a combination of both the Lean and Six Sigma. For example Andresson et al. (2006) suggest that *"Lean manufacturing addresses process flow and waste whereas Six Sigma addresses variation and design."* Smith (2003) highlights that *"removing the low hanging fruit with Lean allows challenges to be identified that require a Six Sigma approach using statistical tools to uncover unseen roots and problems."*

Finally, Dedhia (2005) suggests that enhanced savings can be achieved through combining the approaches stating that Lean Six Sigma can be used in all sectors. *"Lean can reduce waste and improve process efficiency and Six Sigma can reduce variation and improve performance. Savings can be doubled when Lean and Six Sigma are used in a coordinated manner. Both can be used in non manufacturing environments."*

This is supported by O'Rourke (2005) *"the intended outcome of Lean Six Sigma projects is that the combination of both the discipline of Six Sigma and the speed of Lean implementations will produce business and operational excellence."*

2.2.4 Business Process Re-engineering (BPR)

Al-Mashari and Zairi, (2000) in reviewing BPR highlight *"that researchers and practitioners have defined BPR in a variety of ways. However the emphasis in all the definitions is on redesigning business processes using an enabled approach to organisational change. The required change evolves from the recognition that the long established ways an organisation conducts business are likely to have changed in today's competitive environment. There has also been a shift in organisational focus towards improving quality, the customer and innovation rather than focusing on control and cost cutting measures. Therefore organisations are introducing new structures and procedures to reengineer old business processes."*

The term Business Process Improvement (BPI) is also used interchangeably with Business Process Re-engineering (BPR). Although it is argued that BPI is less radical than BPR (Adesola and Baines, 2005). Where BPR is often thought to have originated from Michael Hammer, the concepts of BPI are often attributed to James H Harrington. He defines BPI as *"A methodology that is designed to bring about step-function improvements in administrative and support processes using approaches such as process benchmarking, process redesign and process reengineering"* (Harrington et al., 1997 cited in Adesola and Baines, 2005).

However, across both BPR and BPI the key principles involved are (Adesola and Baines, 2005):

- Understand the business needs and the processes.
- Model and analysing processes.
- Benchmark business processes and their outcomes.
- Use the information to redesign and implement the new processes.
- Review and assess new process performance to feedback into further redesigns.

2.2.5 Process Improvement Techniques

Process improvement has been used to include other approaches of Business Process Improvement identified in the literature that fall outside of the three main techniques identified above. These include Total Quality Management (TQM), ISO9000, European Foundation Quality Model (EFQM), Kaizen and Benchmarking.

Total Quality Management (TQM) can be defined as *“an evolving system of practices, tools and training methods for managing companies to provide customer satisfaction in a rapidly changing environment”* (Anderson et al., 2006).

A core concept in TQM is the management of quality at every stage of operations, from planning and design through self-inspection, to continual process monitoring for improvement opportunities (Radnor, 2000). The notion of total quality management was introduced by Feigenbaum in 1957 whose book ‘Total Quality Control’ was taken on board and utilised by the Japanese. Other quality ‘gurus’ have included; W.E. Deming who developed the ‘14 points for quality improvement’, Juran who introduced the phrase ‘fitness for use’, Ishikawa who created ‘Quality Circles’ as a tool by which worker could participate, Taguchi who focused on the design and engineering-in of quality and, Crosby who implemented the concept of Cost of Quality.

The **European Foundation Quality Model (EFQM)** model is a non descriptive framework based on nine criteria. Five are ‘enabler’ criteria and four are ‘result’ criteria. The enablers cover what an organisation does, while the results cover what an organisation achieves. The model is based on the premise that excellent results in performance, customers, people and society are achieved through effective leadership, sound people management, and development, effective use of partnerships and resources, clear and well directed policy and strategy and effective processes (George et al., 2003).

Organisations adopting the EFQM model can apply for the EFQM Excellence Award. It is claimed to be *“a prestigious award for organisational excellence and has been awarded to Europe’s best performing organisations since 1992”* (www.efqm.org). The award is given after a process of self-assessment and inspection of evidence of achievement in the nine criteria.

ISO9000 is a family of standards for quality management systems and is administered by accreditation and certification bodies. The purpose of ISO9000 is to reduce defects through codification, audit and documentation of process standards. This requires assistance from external experts (Baczewski, 2005). Some of the requirements to achieve ISO9000 accreditation include:

- A set of procedures that cover all key processes in the business.
- Monitoring processes to ensure they are effective.
- Keeping adequate records.
- Checking output for defects, with appropriate corrective action where necessary.
- Regularly reviewing individual processes and the quality system for effectiveness.
- Facilitating continual improvement.

Kaizen is another Japanese term meaning 'continuous improvement'. *"Continuous Improvement is an organisations continual push for obtaining efficiency gains in quality and performance in the value of products or services delivered to customers"* (Cusumano, 1994). Some organisations have focused on Kaizen rather than Lean for improving their processes (Radnor et al., 2006). Related to Kaizen is the use of Kaizen events called Kaizen Blitz or Rapid Improvement Events (RIEs). In these events big improvements can be made quickly regarding time and quality (Manos, 2007). The event is normally held over 3-5 days focusing on recording and evaluating the process, developing and redesigning a new process and implementing and reviewing some results from the event (McNichols, 1999). Kaizen Blitz or RIEs can, and are, being used as stand alone events or as a tool within Lean (Radnor et al., 2006; Radnor and Walley, 2008).

Across many of approaches above an important element often highlighted to support the improvement activity is the use of **Benchmarking**. An article in Management Services (2007) explains that *"Benchmarking looks at the differences between companies and determines the causes of the differences. Looking outside the organisation and sharing information on how other improvement projects are structured and undertaken provides insight into how effective project deployments have been and what could be done to improve them."* Radnor (2000) states that *"by systematically studying the best business practices, operating tactics, and winning strategies of others, an individual, team, or organisation can accelerate its own progress and improvement."*

As a summary, specific characteristics for each of the approaches mentioned are listed in table 1. ISO9000 is not included in this list as it is an accredited standard rather than an approach in itself. Also as very few public sector organisations are ISO9000 accredited as supported by Baczewski (2005) it will not be consider in any detail for the remainder of the review.

Table 1: Characteristics and Comparison of Business Improvement Techniques (based on HM Government, Baczewski, 2005)

Description	Where used	Focus
<p>Lean</p> <p>A way of working which identifies and eliminates waste to deliver improved value and service</p>	<ul style="list-style-type: none"> – Where fast results are needed – Where shorter lead times and improved flexibility are critical – Where large numbers of front line staff work together – Where limited performance data is available 	<ul style="list-style-type: none"> – Process – Customer – Defect reduction – Waste reduction
<p>Six Sigma</p> <p>A structured approach to data driven problem solving</p>	<ul style="list-style-type: none"> – To reduce costs or increase volume – Where mature data analysis is in place – Where time exists to analyse the right data – Where specific training can be set up and supported 	<ul style="list-style-type: none"> – Process – Customer – Defect reduction
<p>BPR</p> <p>An approach to transforming activity through process change</p>	<ul style="list-style-type: none"> – Where IT is likely to be the main driver of change – Change is often done out of line 	<ul style="list-style-type: none"> – Process
<p>Kaizen</p> <p>An approach to continuous incremental improvement, creating more value and less waste</p>	<ul style="list-style-type: none"> – Where fast results are needed – Where the right group of people can be coordinated for a blitz approach 	<ul style="list-style-type: none"> – Process – Customer – Defect reduction – Waste reduction
<p>Benchmarking</p> <p>A comparison with external organisations to highlight and develop best practices</p>	<ul style="list-style-type: none"> – Where time exists to analyse external performance data – Where other improvement strategies are required 	<ul style="list-style-type: none"> – Process – Customer – Defect reduction – Waste reduction
<p>TQM</p> <p>A way of working which focuses all participants on quality, driving long term success through customer satisfaction</p>	<ul style="list-style-type: none"> – Where refocus on customer needs is required – Where formal management systems are already in place 	<ul style="list-style-type: none"> – Process – Customer – Defect reduction
<p>EFQM</p> <p>An organisational framework designed to improve competitiveness using the fundamental concepts of TQM</p>	<ul style="list-style-type: none"> – Where self assessment and peer reviews are valued and repeated periodically 	<ul style="list-style-type: none"> – Process – Customer – Defect reduction

Tools	Benefits	Implementation
<ul style="list-style-type: none"> – Traditional management tools – Statistical Tools 	<ul style="list-style-type: none"> – High potential cash savings – Moderate potential for soft savings – Improvement in service delivery 	<ul style="list-style-type: none"> – External support required – Moderate time from initiation to results – Moderate implementation costs – Significant staff engagement
<ul style="list-style-type: none"> – Traditional management tools – Statistical Tools 	<ul style="list-style-type: none"> – Moderate potential cash savings – High potential for soft savings – Improvement in service delivery 	<ul style="list-style-type: none"> – External support required – Long time from initiation to results – Moderate implementation costs – Some staff engagement
<ul style="list-style-type: none"> – Traditional management tools 	<ul style="list-style-type: none"> – High potential cash savings – Moderate potential for soft savings – Improvement in service delivery 	<ul style="list-style-type: none"> – Moderate time from initiation to results – High implementation costs – Significant staff engagement for short periods
<ul style="list-style-type: none"> – Traditional management tools – Statistical Tools 	<ul style="list-style-type: none"> – High potential cash savings – Moderate potential for soft savings – Improvement in service delivery 	<ul style="list-style-type: none"> – Short time from initiation to results – Low implementation costs – Significant staff engagement for short periods
<ul style="list-style-type: none"> – Traditional management tools 	<ul style="list-style-type: none"> – Moderate potential cash savings – Low potential for soft savings – Improvement in service delivery 	<ul style="list-style-type: none"> – Short time from initiation to results – Low implementation costs – Some staff engagement
<ul style="list-style-type: none"> – Traditional management tools 	<ul style="list-style-type: none"> – Moderate potential cash savings – High potential for soft savings – Improvement in service delivery 	<ul style="list-style-type: none"> – External support required – Long time from initiation to results – Moderate implementation costs – Significant staff engagement
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3

Methods and Framework



This section focuses on the frameworks that have been suggested for the implementation of Lean, Six Sigma, BPR and Process Improvement, as well as the tools that could be used during the implementation.

3.1 Lean

Womack and Jones (1996) five principles of Lean (section 2.2.1) are generally accepted to be the basic framework and methodology of Lean. However, Krings et al. (2006) suggest that Lean improvements can be implemented using a four step approach that will increase the capability and knowledge of improvement within the organisation:

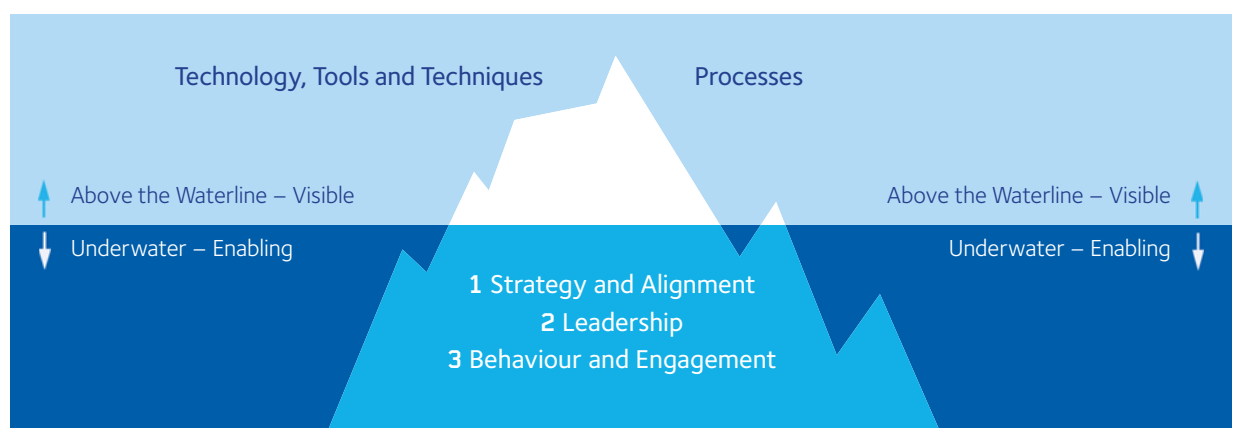
- Understand the needs of the organisation and how it operates by interviewing leaders and key staff members, gathering and analysing data and process observation.
- Develop a critical mass of Lean expertise in the organisation. Beginning with top managers so that they understand and are fully committed to Lean improvement.
- Implement improvements through Kaizen events over the short period or a longer term more guided approach to improvement. Both should use Lean continuous improvement tools, process measurement techniques and project management skills.
- Sustaining Lean is the most difficult aspect of implementations. To embed the Lean philosophy requires a culture of continuous improvement. This involves tracking key performance measures and coaching/mentoring Lean implementers.

However, alongside internal organisational changes, Seddon (2005) argues that the following external factors need to be considered before redesigning services against customer demands:

- Study customer demand.
- Distinguish between value and failure demand.
- Understand if demand is predictable or not.

In implementing Lean, Hines et al. (2008) introduce a framework called 'The Iceberg Model' which is presented in figure 2. In this model they present two main elements: below the water the enabling elements of strategy and alignment, leadership and behaviour and engagement and, above the waterline technology, tools and techniques and, process management.

Figure 2: Iceberg Model (Hines et al., 2008)



From this model they indicate that strategy should be the foundation, supported by decisive leadership and an engaged workforce to understand the processes and then use a range of tools and techniques to improve the processes. A number of tools are used throughout the model including; policy deployment, Plan Do Check Act (PDCA), visual management, standardised work, 5S and process mapping.

Many of the tools for Lean implementation have also been suggested by other authors and are capable of being utilised within the public sector (Esain et al., 2008; Hasenjager, 2006; Porter and Barker; Radnor et al., 2006; Radnor and Bucci, 2007):

- Understanding customer value and what the customer considers waste. Focusing on not only the ultimate customer but internal and external customers as well. Reviewing customer complaints, and assigning team members tasks to determine their internal and external customers' values and what they consider waste in this process.
- Running Kaizen Blitz or rapid improvement events involving employees from with and/or across departments, which scope out issues to be resolved and implement the required changes.
- Carrying out process mapping and value stream: Mapping out the process and assigning cycle and value-added time to each step, looking for bottlenecks, and listing any team concerns or questions to be addressed at a later time. Also root cause analysis and brainstorming can be used to analyse the bottlenecks, find solutions, and streamline the process.
- 5S activity as part of, or separate to, the Kaizen Blitz and process mapping. 5S is a rigorous form of housekeeping which supports the pursuit of waste elimination. It consists of:
 - **Seiri (Sifting)**: Comprises of the removal of all unnecessary items.
 - **Seiton (Simplifying)**: This is when work site items are arranged in the most effective way which could be influenced by frequency of use, work sequence or weight/size. The location for each item is clearly visible and labelled – so if something is missing or in the wrong place it can be clearly seen.
 - **Seiso (Sweeping)**: The traditional view of housekeeping about keeping everything clean, even spotless.
 - **Shitsuke (Standardise)**: Regularly auditing the workplace to ensure standards are being maintained and improved.
 - **Seiketsu (Self Discipline)**: To do with general working environment, provision of work wear and sustaining the housekeeping.
- Implement cross-functional teams involving all relevant employees that work directly on the process at all levels within and outside of the department (i.e. no silos).
- The implementation of standard work, which is a method of defining, organising and agreeing the activity in a process to ensure the most effective and efficient use of resources, people, tools and equipment.
- Using Visual Management as a means to display standards or targets in a process area, together with the current performance achieved. The purpose of this is to make problems visible to the whole team quickly, so that they can be tackled promptly.
- Giving time to problem solving to close performance gaps, to improve service to the customer or to reduce cost. Problems can be solved using informal and/or more structured processes. The 3Cs is a tool of the Unipart Way (Radnor and Bucci, 2007) used to address day-to-day issues affecting performance. The process has 3 steps; define the Concern, discover the root Cause and implement Countermeasures to fix the problem for good. More formal problem solving occurs when individuals meet to discuss and resolve problems in a more structured environment.

- A Workplace Audit is a structured means of monitoring working practices, to ensure conformance to standards so that the improvements achieved during the implementation phase are sustained and continuously improved upon.

Hines and Rich (1997) present a 'Value Stream Analysis Tool' which uses a weighted system to analyse waste and tools in order to assist organisations choose the correct tools to reduce waste. This tool involves (Hines and Rich, 1997):

- Identifying the benchmark company in the sector to get people to think about who is best at reducing waste.
- Ascertaining the importance of each waste by assigning weights to them.
- Creating total weights for each tool in order to identify how useful each tool is in identifying the various wastes designated as most important by the organisation.

Rees et al. (1996) note that Lean implementations are affected by the organisational context into which they are introduced. This could include the size, sector, union presence or absence, greenfield/brownfield site and legal framework. *"Therefore Lean is not a homogeneous or invariable state but a context-dependent process"* (Rees et al., 1996).

From a government perspective Morales and Maldonado (2004) describe a Lean framework as *"requiring the development of a well rounded strategy with an operational foundation. It implies interconnectivity, interdependence between parts of the system. After this requirement is the need to streamline the process using value stream mapping to deliver value to citizens. This involves drawing the current state map to enable information regarding the processes to be visualised. The future state should be developed focusing on how the process should operate and its impact on delivering value. An implementation plan should be developed that describes the projects that are necessary to realise the future state map. This should stress the continuous and incremental improvement with the programme of services to the citizen"* (Morales and Maldonado, 2004).

3.2 Six Sigma

Many of the writings outline the history and background of Six Sigma. The concept of Six Sigma was introduced by Bill Smith in 1986, a senior engineer and scientist within Motorola's Communication Division, in response to problems associated with high warranty claims. However, it is Mikel Harry formerly at Motorola who is accredited with the development of the Six Sigma concept in the late 1980s (Antony, 2006; Harrington, 2005). Motorola and GE are the two organisations who are mentioned as the 'founders' of Six Sigma applying it in both manufacturing and service areas.

Six Sigma implementations use a DMAIC methodology (Dedhia, 2005):

- **Define:** A clear and explicit definition of the problem is vital in project selection and prioritisation. A well defined problem sets ground rules for improvement.
- **Measure:** Measurement points, sources, tools and equipment, and precision and accuracy play a vital role in the project. Without measurement there is no control. Measurements are essential to collect data.
- **Analyse:** Using the right approach, analytical tools or methods will help to find a clearly defined solution. Data is analysed into information to create a knowledge base and make decisions for actions.
- **Improve:** Select and implement the best solution to remove the cause of a problem will bring the desired result. Improvements are corrective and preventive actions.
- **Control:** After the implementation of improvement activities, monitoring becomes essential to control the processes.

There is a clear team structure within a Six Sigma project with members moving from a Green Belt to a Master Black Belt depending on their training and level of involvements within projects. In summary, team members on Six Sigma projects have the following roles (Dedhia, 2005):

- Executive who commits resources and sponsors the projects.
- Master Black Belt who provides training and coaching.
- Black Belt who leads the improvement project.
- Green Belt who supports and runs projects.
- Champion who is involved in supporting the project.

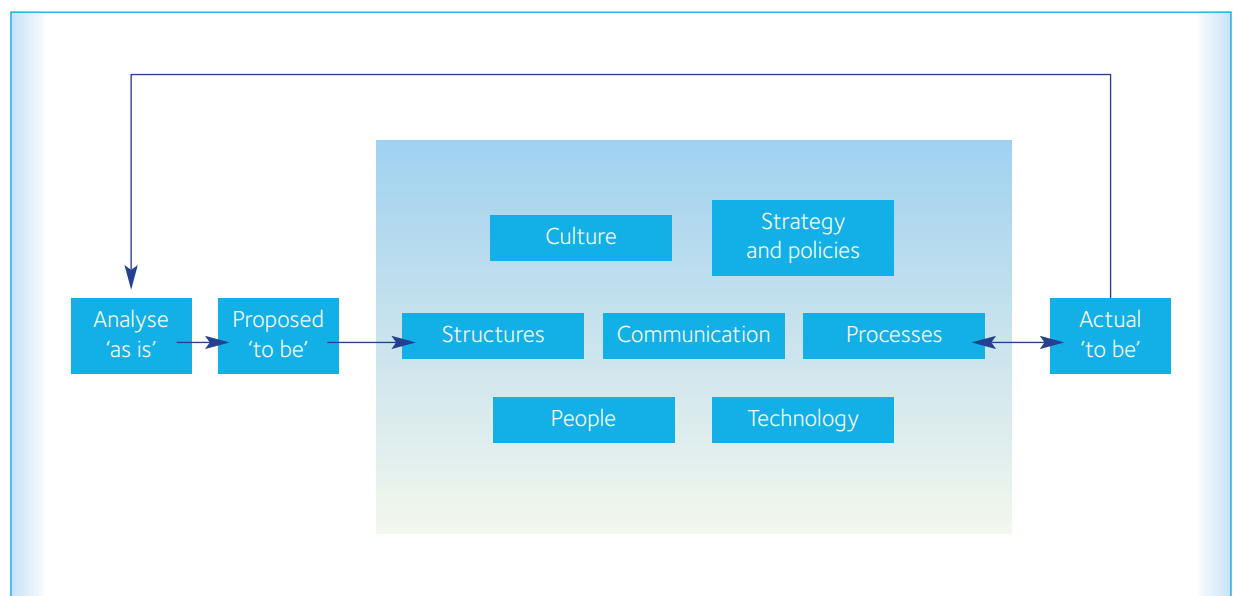
Champions lead projects and ensure that all improvements become cemented. Green Belts participate in projects and are usually can engineers, supervisors and quality control experts. They receive mentoring from the Black Belts (Smith, 2003).

The tools used in Six Sigma deployments vary from the development and analysis of visual charts to the use of similar tools used in Lean Implementations (Harrington, 2005). The use of pareto charts, scatter diagrams, histograms, regression analysis and statistical process control, combine the rigor and objectivity of statistical analysis with the ability to visually interpret quantitative information, thereby revealing more process information. These allow differentiation between common variations and special variations to be highlighted. Statistical Process Control (SPC) charts show variation in process through data points over time relative to a central line with upper and lower control limits. They highlight whether a process is in control or whether corrective action is needed. Effective change and sustained improvement can only be claimed if the process is known to be in control (James, 2005).

3.3 Business Process Re-engineering (BPR)

BPR involves the development from an 'as-is' process to the development and implementation of an actual 'to-be' process. McAdam and Mitchell (1998) summaries this process in figure 3 which incorporates the seven essential success factors for BPR and a continual review process.

Figure 3: BPR Implementation Methodology (McAdam and Mitchell, 1998)



Adesola and Baines, 2006 give a clear methodology for BPR implementation which is presented in table 2.

Table 2: BPR Implementation Methodology (Adesola and Baines, 2006)

Step	Step Description	Techniques
1 Understand Business Needs	<ul style="list-style-type: none"> – Develop vision and strategic objectives – Perform competitor analysis – Develop organisational model – Evaluate current practices – Prioritise objectives – Scope change – Establish measurable targets – Develop process objectives and assess readiness – Obtain approval and initial project resource – Benchmark the process 	<ul style="list-style-type: none"> – Organisation model – SWOT analysis – Force field analysis – Readiness assessment – Stakeholder analysis – Process prioritisation matrix – Pareto analysis – Process performance table
2 Understand the Process	<ul style="list-style-type: none"> – Identify business process architecture – Scope and define process – Capture and model the ‘as is’ process – Model the process 	<ul style="list-style-type: none"> – XPat process – IDEFO – Walkthrough – Process flowchart – ABC – Cause and effect analysis
3 Model and Analyse Process	<ul style="list-style-type: none"> – Verify and validate model – Measure existing process performance – Analyse business process 	<ul style="list-style-type: none"> – Value added analysis
4 Redesign Process	<ul style="list-style-type: none"> – Benchmark the process – Identify performance criteria for redesign process – Identify focus of redesign activity – Model and validate the ‘to be’ process – Identify IT requirements – Estimate performance of redesigned process 	<ul style="list-style-type: none"> – Benchmarking – Creative silence workshop – Brainstorming
5 Implement New Process	<ul style="list-style-type: none"> – Plan the implementation – Obtain implementation approval – Review change management plan – Communicate the change – Technological development – Make new process operational – Train staff – Roll out changes 	
6 Assess New Process and Methodology	<ul style="list-style-type: none"> – Conduct process deployment and performance data reflections – Revise organisational approach 	<ul style="list-style-type: none"> – Action plan – Evaluation measurement report – Customers measurement survey
7 Review New Process	<ul style="list-style-type: none"> – Develop strategic view of business – Set process targets and performance – Develop plan to meet targets – Implement plan 	<ul style="list-style-type: none"> – Process improvement matrix

3.4 Process Improvement

In relation to the other Business Process Improvement approaches being considered the implementation of **Kaizen** has been described in section 2.2.4 as a 3-5 day event focusing on a particular process and engaging representatives of all personnel with the process in order to map the process, usually carry out '5S' in order to implement some change during the event thus, achieving high impact and significant changes (Esain et al., 2008).

Jackson (2000) describes the implementation method of achieving the **European Foundation Quality Model (EFQM)** involving:

- One-to-one training for senior staff and managers.
- Expert training away from site.
- Step by step application of model concepts.
- Regular follow up to allow self assessment.
- Training in theories and techniques such as process mapping and pareto analysis.
- Setting up improvement teams with clear remits, support, encouragement, opportunities for learning and a process for regular review.
- Visible support and role model actions from heads of departments and senior managers.

She also suggests that *"Alongside this learning methods need to be applied. This mainly involves benchmarking visits to and from other relevant organisations and sharing experiences with visitors thinking of applying the model"* (Jackson, 2000).

As mentioned, in order to receive the EFQM Excellence Award, organisations have to complete a self assessment application form. Together with this application form, applicants have to demonstrate the evidence that supports the information that is provided. The application is then assessed by independent executive from business and public sector organisations. If the organisation receives the required score from the evaluation they will then be awarded the EFQM award.

The 1990s saw the development of **Total Quality Management (TQM)** based on the principles of Total Quality Control (TQC) which can be defined as quality control techniques based on statistical analysis. Dahlgaard and Dahlgaard-Park (2006) describe TQM as *"a corporate culture characterized by increased customer satisfaction through continuous improvements, in which all employees actively participate."* Therefore, TQM promotes ownership and a culture of improvement, team working and commitment based on the principles of customer orientation, process orientation and continuous improvement.

TQM is often focused on a discrete narrow part of the process and involves a number of techniques or practices including benchmarking, reduced cycle time, continuous improvement and Kaizen. All of these are used as a control technique in that targets for the employees are set then, through the use of problem solving tools, improvements made. Some authors describe this process of TQM and continuous improvement through the use of an improvement cycle composing of four stages: Plan Do Study Act (PDSA) or Plan Do Check Act (PDCA) (e.g. Dahlgaard and Dahlgaard-Park, 2006; Andresson et al., 2006).

Baczewski (2005) reminds us that *“a benchmark is a standard by which others can be measured.”* The pioneers of the **benchmarking** technique were Xerox Corporation who in 1979 initiated a process called Competitive Benchmarking. Xerox felt that benchmarking was the process by which customer requirements could be understood and employee involvement was the process by which benchmarking would be implemented (Camp, 1989). The chief executive, David Kearns, of Xerox defined benchmarking as *“the continuous process of measuring products, services, and practices against the toughest competitors or those companies recognised as industry leaders.”* The five phase benchmarking process consists of planning, analysis, integration, action and maturity which will lead to operational improvement and achievement of superiority (Camp, 1989). However, the concept of benchmarking has been evolved to a number of types including (Bogan and English, 1994):

- Process Benchmarking which focuses on the discrete work processes and operating systems, such as customer complaint process, the billing process, to the recruitment process.
- Performance Benchmarking which enables managers to assess their competitive positions through product and service comparisons. For example focusing on price, technical quality, speed and reliability.
- Strategic Benchmarking examines how companies compete. It seeks to identify the winning strategies that have enabled high-performing companies to be successful in their marketplace.

An important element of Benchmarking mentioned by many authors in this area is to look outside your own organisation and sector. As Baczewski (2005) states *“Out of industry benchmarking is often valuable in achieving breakthrough improvements.”*

3.5 The Same or Different?

As mentioned in section 2.2.3 a number of authors have suggested that Lean and Six Sigma can be combined in order to generate greater impact and returns – this combination will be considered again later in the report regarding sustainability of process improvement. Table 1 in section 2 also gives an overview of the various Business Process Improvements illustrating that there is some overlap with the various concepts.

Anderson et al. (2006) argue that Six Sigma and Lean can be seen as a collection of concepts and tools, which support the overall principles and aims of TQM. *“Both Six Sigma and Lean have clear road maps in order to achieve business excellence, but it is also important to stress the corporate culture and human factor, which TQM gives”* (Anderson et al., 2006). Dahlgaard and Dahlgaard-Park (2006) also present a paper which suggests that Lean, Six Sigma and other associated process improvement methodologies sit ‘under the TQM umbrella’. Harrington (2005) describes ‘Total Six Sigma’ saying that it includes, amongst other things, Re-engineering, Project Management, organisational change, risk analysis, knowledge management, benchmarking and Lean. He goes on to point out that *“one of the most used tools in Total Six Sigma is Business Process Improvement (BPI)”* (Harrington, 2005).

However Seddon (2005) argues strongly that the ‘titles’ of the various approaches i.e. Lean, Six Sigma etc. are both a distraction and dangerous. He argues that the drive of improvement should come from understanding the system and the ‘flow’ which is driven by demands of the customer rather than, the use of tools and techniques as a means to produce the ‘answer’ (Seddon, 2005). He suggests that ‘Systems Thinking’ involves understanding work as a system and leads to managing flow rather than function. It requires the development of different measures and methods. These ensure that customers receive a consistently high level of quality in every product or service (Seddon, 2005). In Seddon and Caulkin (2007) the bases of learning and development of the systems view, and so Systems Thinking, is argued to be PDCA and the work of Deming.

It is widely recognised that Ohno (the founder of the Toyota Production System) adopted and adapted the concepts and ideas of Deming around statistical quality control after he heard him speak in Japan in 1950. At the same time he also visited the Ford plant in Detroit and whilst he was taken by the concept of flow he also felt that there was a lot of waste (Dahlgard and Dahlgard-Park, 2006). As noted by Seddon and Caulkin (2005) *“what Ohno saw at the Ford Plant was ‘flow and heartbeat’ whereas the Americans saw ‘volume and speed’.*” On returning to Japan he implemented what has become known as ‘The Toyota Production System’ which later (1986) was labelled as Lean Production and Lean Thinking by Womack et al. (1990).

Many of the responses of the experts from the expert panel survey mentioned Deming as the foundation of Business Process Improvement and associated methodologies. Therefore, what follows is a summary of the Deming Philosophy.

3.5.1 The Deming Philosophy

As mentioned, Deming went to Tokyo in mid June 1950 to teach plants managers and engineers about quality control. Whilst he was there he also asked to speak to Japanese Chief Executives (21 companies including Nissan, Toyota, Sony) because he recognised that *“in the early days management failed to understand the importance of process, they saw it as the engineers area and about solving localised problems”* (Neave, 1988).

The quality control methods Deming taught were inspired by the work of Dr Walter Shewhart, who was the originator of the concepts of statistical control of processes (nowadays referred to as Statistical Process Control (SPC)) (Neave, 1988). The basis of these methods was about understanding variation in the process. *“While every process displays variation, some processes display controlled variation, while others uncontrolled variation. With Controlled (stable) variation, the general behaviour of the process and measurements taken stay the same over time. Whereas, with uncontrolled (unstable) variation the behaviour is subject to change, usually in unpredictable ways and at unpredictable times”* (Neave, 1988).

Deming referred to uncontrolled variation as special causes (e.g. new recruit, changing work patterns, information and material not available) and, controlled variation as common causes – *“those due to the process itself, the way it has been designed and built and set up”* (Deming, 1986). He argued that real improvement comes with management action *“when special causes have been eliminated, so only common causes remain”* and, *“Quality improvement (variation reduction) efforts must therefore be guided by information on whether or not special causes are present”* (Deming, 1986). Therefore, he stressed that management must understand variation and manage it (through the use of tools such as control charts) or they may make things worse.

A concise representation of the Deming Philosophy is the Joiner Triangle: Obsession with quality, scientific approach (understanding the nature of variation and common and special causes) and all one team. By ‘one team’ Deming meant total teamwork within an organisation. It is more than everyone putting forth best efforts from their own individual viewpoint which may result in much wasted labour, but everyone needing to pull in the same direction, the direction which is of the greatest benefit to the company as a whole (Neave, 1988). Finally, importantly, *“Deming speaks of the customer as ‘the most important part of the production line’”* (Neave, 1988).

The most recognised and quoted element of the Deming Philosophy is the ‘14 points’. Although Neave (1988) is quick to point out that, *“they do not constitute the whole Deming philosophy – they are just particular important constituents of it. They are vehicles for opening up the mind of new thinking, to possibility that there are radically different ways of organising our businesses and working with people... I would suggest that to treat the 14 points just as a recipe is in fact a pretty sure recipe for disaster.”* The Deming 14 points are set out in table 3 – many which will be referred to in the following two sections on organisational readiness and success factors in relation to the implementation of Lean and Six Sigma.

Table 3: Deming's 14 Points

Point	Description
1 Constancy of purpose	...for continual improvement, allocating resources to a plan to become competitive, to stay in business, and to provide jobs.
2 Adopt a new philosophy	...that ensures organisations no longer have commonly accepted levels of delays, mistakes, defective materials, and defective workmanship.
3 Cease dependence on inspection	...as the way of life to achieve quality by building quality into the product/process in the first place.
4 End the award of business solely on the basis of price tag.	Instead require meaningful measures of quality along with price. Reduce the number of suppliers by eliminating those that do not qualify with statistical and other evidence of quality.
5 Improve constantly and forever every process for planning, production, and service.	Search continually for problems in order to improve every activity in the company, to improve quality and productivity, and thus to constantly decrease costs. Management's job to work continually on the system.
6 Institute training on the job for all	...including management, to make better use of every employee. New skills are required to keep up with changes in materials, methods, product and service design, machinery, techniques, and service.
7 Adopt and institute leadership aimed at helping people do a better job.	The responsibility of managers and supervisors must change to quality. Improvement of quality will automatically improve productivity. Managers must ensure immediate action is taken.
8 Encourage effective two way communication and other means to drive out fear throughout the organisation.	Encourage effective two way communication and other means to drive out fear throughout the organisation.
9 Break down barriers between departments and staff areas.	People in different areas must work in teams to tackle problems that may be encountered with products or service.
10 Eliminate the use of slogans, posters and exhortations	...for the work force, demanding zero defects and new levels of productivity, without providing methods.
11 Eliminate arbitrary numerical targets.	Eliminate work standards that prescribe quotas for the work force and numerical goals for people in management. Substitute aids and helpful supervision; use statistical methods for continual improvement of quality and productivity.
12 Permit pride of workmanship.	Remove the barriers that rob hourly workers, and people in management, of their right to pride of workmanship. Abolition of merit rating and management by objectives.
13 Encourage Education.	Institute a vigorous program of education, and encourage self improvement for everyone.
14 Top Management's Commitment.	Clearly define top management's permanent commitment to ever improving quality and productivity, and their obligation to implement all of these principles.

4

Organisational Readiness



This section focuses on the drivers and organisational readiness of business process improvement techniques. That is, the reasons why organisations undertake improvement and whether the organisations are actually in a position and have the ‘enablers’ to fully embrace the opportunities available from business improvement. Having briefly considered the drivers the section outlines the main elements of organisational readiness and enablers both in general and in particular for the public sector. This section is more focused upon Lean implementations than other approaches. This is because the literature appears to have outlined the characteristics that organisations need to have that would enable them to benefit from the wider implications of Lean.

4.1 Drivers for Improvements

Few publications described ‘the drivers’ for introducing business process improvement methodologies. What many have tended to do was to outline the expected outcomes from its implementation. In summary, many stated that the drivers for introducing Lean and Six Sigma improvement come from the need to reduce costs and increase quality (e.g. Oakland and Tanner, 2007). Although increased quality was often expanded to include increased customer service/satisfaction and quicker/more efficient processes. *“For public services the results of a Lean implementation should be seen in terms of reduced in lead time, backlogs and improved productivity and turnaround times”* (Bhatia and Drew, 2006).

However, in the evaluation project commissioned by the Scottish Executive (Radnor and Walley, 2008) noted that for the case studies included, and so within the public sector, the drivers for change include:

- A change of leadership.
- Struggle with performance indicators.
- The introduction of a new technology.
- Government agendas.
- Changing policy environment.
- Threat of competition.
- Demand for increased efficiency.
- Service expansion with limited resources.

Newbold (2006) highlights the particular drivers for the National Health Service (NHS). *“The NHS is facing major economic challenges which are becoming the drivers for using Lean principles. Specifically, the NHS has to achieve efficiency savings of £6.5 billion by 2007/08 by reducing civil service posts, streamlining back office functions, achieving better value for money, improving social care and making better use of staff time. The major impact of Lean principles on the NHS should be to remove errors from processes which requires ongoing monitoring of the process and intensive coaching and mentoring of staff to ensure that new knowledge is quickly transferred”* (Newbold, 2006).

4.2 Organisational Readiness

Organisational readiness is a key factor in the success of Lean and associated business process improvement methodologies. Using technology, tools and techniques that affect the processes will not by themselves deliver business transformation, even if these tools and techniques are visible across the whole of the organisation. Implementing change in organisations depends upon addressing all of the less visible but enabling elements that are essential in order to deliver a successful, sustainable transformation.

Hensley and Dobie (2005) suggest that readiness equates to “*organisational experience with improvement programs*” and ‘*organisational understanding of processes*.’” Smalley (2005) argues that the readiness of an organisation to implement Lean depends upon whether it has achieved the basic stability that allows flow and pull to operate. He states that ‘basic stability’ implies general predictability and consistent availability in terms of manpower, machines, materials and methods.

- **Manpower:** A well trained workforce has three training components for supervisors:
 - Job instruction: how to plan for the correct resources they need in production, how to break down jobs for instruction and how to teach people safely, correctly and conscientiously.
 - Job methods: how to analyse jobs and make simple improvements within the realms of control.
 - Job relations: how to treat people as individuals and solve basic human related problems in production.
- **Machines:** Know your customer demand, the capacity of the process and the actual average output. Understand the difference between theoretical capacity and true capacity so that true capacity can meet demand levels.
- **Materials:** Understand the types of inventory; cycle stock, buffer stock, safety stock. The inventory beyond what is needed to run the process is a waste.
- **Methods:** A standard is a measure or a basis for comparison to determine whether the new way is better or not.

Balle and Regnier (2007) also suggest that for Lean to be successful there is a need to “*tackle Basic Stability first and foremost, first in environment, followed by working standards.*” They state that Basic Stability is essential to create a learning environment – where employees learn to identify the abnormalities. Although they recognised that in the public sector/healthcare example given “*identifying what is abnormal is not easy – need to educate people to see abnormalities at a glance*” (Balle and Regnier, 2007).

Considering manufacturing companies committed to implementing Lean it is suggested that they have characteristics such as (Bicheno, 2004; Oliver, 1992; Sohal, 1994):

- A good understanding of the applicability of Lean principles to the organisation.
- Utilise soft technologies with a quality practice in place.
- Team based work organisation who undertake active problem solving activities.
- Hold a strong, close relationship with a few suppliers.
- Share statistical information openly and regularly with customers and suppliers.
- Understand their systems and processes and have strong process flexibility.
- Have Lean driven by the human resources function, not just senior management.

- Understand their customer and have noticed increased customer satisfaction and other business improvements.
- Use value stream mapping to identify waste more readily.
- Know what areas will be studied to achieve improvements in the future and be searching for improvements to customer-based activities.

Womack (2004) defines the three key attributes in the perfect service process:

- 1 It creates precisely the right value for the customer.
- 2 The steps in the process have to be link flow, pull and levelled demand.
- 3 The steps must be satisfying for people to perform.

The perfect process is valuable, capable, available, adequate and flexible.

Nightingale (1999) (cited in Comm and Mathaisel, 2005) outlines nine overarching practices in a proposed Lean framework developed at MIT:

- 1 Optimising the flow of products and services, either affecting or within the process, from concept design through point of use.
- 2 Providing processes and technologies for seamless transfer of, and access to, pertinent data and information.
- 3 Optimising the capability and utilisation of people.
- 4 Implementing integrated product and process development teams.
- 5 Developing relationships built on mutual trust and commitment.
- 6 Continuously focusing on the customer.
- 7 Promoting Lean Thinking at all levels.
- 8 Continuously processing improvements.
- 9 Maximising stability in a changing environment.

Based on these overarching practices Comm and Mathaisel (2005) list a number of enablers:

- Environment for change.
- Leadership.
- Culture – Employee empowerment.
- Training.
- Communication.
- Measurement.

Bendell (2005) suggests that in terms of a model desirable features of both Six Sigma and Lean should be:

- Strategic.
- Not just systems approach – integrated people and systems approach.
- Involvement and participation (not just specialist functions, e.g. Operations Research).
- Deployed change agents with line reporting.
- Results-focused.
- Measurement and ‘tool’ based.
- Integrated training and deployment.

4.3 Public Sector Organisational Readiness

In terms of public sector organisational readiness – also called enablers – these can be identified and summarised, particularly for Lean, as (Bateman and Rich, 2003; Bhatia and Drew, 2006; Hines and Lethbridge, 2008; Hines et al., 2008; Radnor et al., 2006; Radnor and Bucci, 2007a; Radnor and Walley, 2008):

- Generating a vision of a fully integrated Lean organisation at the outset of implementation – a clear and focus improvement strategy.
- Being realistic about the timescales involved in making changes and embedding the process – realisation that the organisation is on a journey.
- Engaging staff and helping them to understand how the Lean approach may impact upon the organisation – employee driven change.
- Evaluating the degree to which a process view already exists within the organisation – focusing on the process.
- Understanding customer requirements – focus on value and removing waste.
- Understanding variation – having access to demand data.

Parks (2002) points out that the transformation to becoming a Lean organisation requires a careful **strategy**. It is important to be clear about the aims, e.g. reduction of errors, improvement in productivity or customer satisfaction etc. Balle and Regnier (2007) support this need for a strategic approach to service improvement *“much of success is contributed to the systemic improvements obtained by getting the whole hospital to progress at the same time.”*

Womack and Jones (1990) are very clear about the importance of having engaged and change driven by the **staff**. *“An ideal Lean system consists of all members within the system sharing information and resources in a team-oriented, multi-functional environment. The skills and abilities to share and work in multi-functional teams are key underpinnings of Lean”* (Womack and Jones, 1990).

The evaluation for the Scottish Executive also clearly identified the need to have staff full involved in the improvement process. *“Successful implementation needs to include developing a culture that involves everyone, everyone needs to be trained in Lean, need to be driven by the people, needs to be adapted not adopted”* (Radnor and Walley, 2008).

Understanding and defining the **process** more clearly is another key element of readiness within business process improvement methodologies. McNulty (2003) defines *“a process perspective (being) more concerned with value creation, rather than merely control of the value creation process.”* There is a need to remember processes are dynamic and usually across boundaries so the ability to understand them is not easy. *“Most difficult problems in business process management involve managing across functional boundaries. Hence, an appreciation for dynamic cross-functional business processes is absolutely essential”* (Gulledge and Sommer, 2002).

Bhatia and Drew, 2006 highlight the importance of taking the customer’s perspective and understanding what the customer values. Krings et al. (2006) state that the implementation of Lean in public sector organisations is more complex than private sector companies as, the public sector cannot always identify the **customer**, nor can they know what customers find value adding. Also, there may be an unwillingness to recognise that customers exist because of the belief that true customers are those who have a choice of service provider rather than individuals who can expect a level of service (Radnor and Bucci, 2007). Additionally the issue of the customer may be complicated by the presence of other key stakeholders who may also define the value of any service or process (Kollberg and Dahlgaard, 2005). There is also a need to take into account the laws and regulations that apply to the organisation, some of which make the identification of value streams difficult from a customer perspective (Scorsone, 2008; Oakland and Tanner, 2007; Walley et al., 2006).

The Deming Philosophy outlined in section 3.5.1 clearly states the need to understand, monitor and manage **variation** as a critical part of process improvement. As Seddon and Caulkin (2007) stress, there is a direct relationship between variation or variety and, demand. *“Demand into service organisations can vary as greatly as the customers who co-create the service”* (Seddon and Caulkin, 2007). However, they also note that in the example of an Adult Social Care department of a Local Council no demand data was available. Walley and Silvester (2006) give a number of examples in the NHS illustrating the lack of understanding of what the demand is and, more importantly, the effect. They note that *“Where variation occurs in congested systems, queues are likely to form. If the system is operating very close to capacity or if degree of variation is high these queues are likely to get out of control, resulting in reduced service efficiency and service quality”* (Walley and Silvester, 2006). In another article they suggest that the reaction in the NHS, and it could be argued in the majority of public services, due to the lack of understanding of demand – in relation to types and patterns – the management response to managing the variation and high variety is to add capacity (Walley et al., 2006). However, *“most health queues are relatively stable around a mean figure, suggesting that it is the capacity and demand variation over time that is the cause of the delays. The most effective way to reduce the queues is to manage the variation rather than increase the capacity”* (Walley et al., 2006).

5

Success Factors for Implementation



This section focuses on the success factors, highlighted in the literature, for implementing business process improvement methodologies. The success factors common across the methodologies are presented first, followed by the particular factors highlighted for particular methodologies.

Womack and Jones (1996) state that, *“success requires determination, commitment from senior executives and support from trained experts.”* Antony et al. (2007) and Antony (2006) clearly highlight that for Six Sigma implementation the critical success factors are uncompromising top management support and commitment; formation of Six Sigma infrastructure & training; project selection and associated financial returns to the bottom line; effective communication at all levels; developing organisational readiness and; effective leadership. Dahlgard and Dahlgard-Park, 2006 suggest that *“the essence of TQM, Lean production and Six Sigma quality may be boiled down to Leadership, efficient CFM (Customer Focused Management), empowerment and partnerships.”* Many other authors agree with many of the factors highlighted by Antony and Dahlgard. The ones most often mentioned are presented first.

5.1 Leadership

A number of authors reporting on Lean, Six Sigma and BPR implementations stress the importance of committed leadership. Process improvement leads to a significant change in culture, so requires strong leadership, visible support from management and patience. It is vital for senior management to show genuine interest, support and act upon the results delivered and ensure the sustainability of the changes (Bateman, 2005; Bateman and Rich, 2003; Fillingham, 2007; Hines and Lethbridge, 2008; Parks, 2002; Oakland and Tanner, 2007).

A survey conducted within the evaluation for Scottish Executive reported that 61% of organisation highlighted that the key success factors contributing to Lean projects included commitment from senior management, experienced delivery team that dedicate time to projects, involvement in all stages and dedicated champions to drive the improvements (Radnor et al., 2006). The findings from the case studies in the same evaluation and the evaluation within HMRC also indicated the need for strong leadership. *“There was seen to be a direct correlation between the engagement of the Senior Manager and Management Teams and the attitude of staff towards capability, delivery and Lean in particular”* (Radnor and Bucci, 2007a).

Spear (2004), in discussing the Toyota Production System, states that *“Training to develop leaders should be tailored and structured accordingly.”* It should aim to develop skills of observation and potential for making improvements (Spear, 2004). When analysing the implementation of Six Sigma, Tanner et al. (2007), supported by other authors, point out that *“strong support and adequate resources from top management can multiply possible effects.”* Dedhia (2005) explains that the reason for the need for commitment leadership is because management are required to have *“obsessive and compulsive commitment to drive Six Sigma deep into (an organisation’s) culture.”*

Smith (2003) states that successful Lean Six Sigma implementation depends on management developing a vision and strategy for change. Even, in BPR implementation leadership and motivation for the project are critical so that there is a clear business vision and all departments give BPR top priority (Do Carmo Caccia-Bava et al., 2005).

5.2 Communication

- Effective communication is another critical success factor, particularly in the public sector, to manage expectations and keep staff and customers informed. This also includes disseminating and celebrating success stories (Bateman and Rich, 2003; ODPM, 2005).
- In the Scottish Executive evaluation survey 49% of organisations engaged staff in Lean projects through direct consultation/communication with staff, workshops and awareness sessions and regular meetings to discuss and report on improvements (Manufacturing Foundation, 2004; Radnor et al., 2006).
- However, as O'Rourke (2005) and Taner et al. (2007) state, a high level of communication needs to come not only from the top down of an organisation but also from the bottom up.

5.3 Measures and Measurement Systems

Bhatia and Drew, (2006) state that a key element of successful Lean implementations, in the public sector, is *“developing a performance culture and using performance management systems that break down top-level objectives into clear, measurable targets that workers can understand and accept and meet.”* Regarding these measures and targets they point out that (Bhatia and Drew, 2006):

- Defining and managing the end-to-end processes by focusing on more than just the targets.
- Costs, quality and lead times are important but so is social value and equitable provision of services.

Comm and Mathaisel (2005) give justification for measurement based on the need to keep a focus on performance. *“One of the key benefits of Lean Thinking is the creation of a culture focused on performance, holding each step accountable. Measurements are the only way to determine progress”* (Comm and Mathaisel, 2005).

Bateman and Rich (2006) highlight the need to understand the relationship between measurement and communication for process improvement within the public sector saying that it is important to *“integrate the measurement system within an effective communication system”* so that employees can understand *“the importance of measures and their logical relationship with business-level improvement.”*

A similar point is made by Walley and Silvester (2006) who emphasis the relationship between measurement and culture within a healthcare setting. *“Need to (have) consistency between the measurement system and the behaviour it is trying to engender, the root causes of the wait times and the solutions, the management style and the improvement culture and the reward style and good clinical practice”* (Walley and Silvester, 2006).

5.4 Training and Development

In their survey the Manufacturing Foundation (2004) stressed the importance of integrating accredited training and workforce development, change management and rapid improvement techniques. Soltani et al. (2007) suggest that *“no change initiative programme can provide competitive advantage to any organisation unless there is training for quality as part of the change initiative policy.”*

Soltani et al. (2007) argue that there is *“clear unambiguous evidence from previous surveys that the presence of a proper training programme for each individual employee (top executives to shop floor) makes a considerable difference to resolving the tension among different organisational beneficiaries. Such a training system will help managers to allow users to implement any change initiatives; interpret and analyse the information produced by these systems, to enable them to cope with their superiors and subordinates.”*

Hasenjager (2006) reported that the most important aspect of the Lean Government initiative was the development of cross-functional Lean teams participating in a series of training and group work sessions. These Lean teams:

- Identified customer values and needs.
- Mapped out processes and procedures.
- Reviewed and implement team building skills.
- Supervised simulation of the Lean technique.
- Reviewed Lean principles and theory.
- Analysed processes and procedures.

Reporting on the introduction of the Toyota Production System, Spear (2004) notes four fundamental principles for training:

- Observation should not be substituted by indirect observation via reports, narratives, statistics etc.
- Proposed changes should be structured as experiments, adopting scientific methods to test hypotheses and use the results to refine or reject the hypotheses.
- Workers and managers should experiment as often as possible, with the focus on quick simple experiments rather than a few lengthy ones.
- Managers should coach and not fix. The technical specialists who undertake the day-to-day job should do the observation and experimentation in order to improve operating systems.

5.5 Other Success Factors

Other success factors mentioned in the publications include:

- Introduction of structured problem solving approaches e.g. PDCA/PDSA. Walley et al. (2006) stress the importance of *“developing an open management style that engages staff in improvement activity and encourages staff to expose and solve problems.”*
- The use of experts and/or external support particularly, at the start of the implementation process (Womack and Jones, 1996b). Radnor et al. (2006) noted that in a number of the cases in the Scottish Executive evaluation *“the use of a high level of expertise in delivering implementation programmes using Lean practitioners with hands on process improvement expertise and relevant production management experience.”*
- Allocation of large amounts of resources. In the survey of Scottish public sector organisations, 90% of organisations highlighted that the resources required to implement Lean were additional internal and external staffing, additional time commitment from all involved, additional funding and additional training (Radnor et al., 2006).
- The importance of the role of the middle managers. As mentioned in section 4.3, an important factor for readiness in process improvement is the acceptance, engagement and implementation of basic principles by employees. However as Dedhia, (2005); O’Rourke (2005) and Radnor and Bucci (2007a) highlight, this requires active and supportive middle managers.
- Reward and recognition for all employees. The use of awards for both Lean and Six Sigma implementation has been highlighted as an element supporting their success. An accurate and fair evaluation of all projects undertaken with meaningful rewards and recognition for employees is felt to be important by O’Rourke (2005) and Taner et al. (2007) regarding Six Sigma. For Lean celebrating success was an important access to allow the implementation to continue (Radnor and Bucci, 2007a).

5.6 Success Factors specific for Lean

When applying Lean in the public sector, it is unrealistic to expect a total transformation of the organisation within months. Identifying a single yet significant project for improvement using a dedicated team who can learn and apply the techniques is a good way of progressing down the implementation route and gaining initial results and experience. This may also act as a catalyst and model for others to follow. This helps awareness, reduces resistance to change by reinforcing Leans credibility and enables employees to see immediate benefits (Parks, 2002; Porter and Barker, 2005; Radnor and Walley, 2008).

5.7 Success Factors specific for Six Sigma

As well as the success factors detailed in sections 5.1–5.5, success factors for Six Sigma implementation, as outlined by a number of authors, include the design, implementation and support of the ‘project’ structure and infrastructure. This is illustrated by a survey of UK organisations carried out by Antony and Banuelas (2002) who reported that the key ingredients for Six Sigma programmes were (in descending order):

- Management commitment and involvement in the implementations.
- Understanding the Six Sigma methodology, tools and techniques.
- Linking Six Sigma to business strategy.
- Linking Six Sigma to customer expectations and requirements.
- Project selection, reviews and tracking.
- Effective organisational infrastructure to support implementations.
- Culture change and change in attitudes of employees.
- Good project management skills to meet deadlines or milestones during projects.
- Linking Six Sigma to suppliers.
- Training for employees using the Belt system to ensure everyone speaks the same language.
- Linking Six Sigma to employees.

Similarly in a report by Management Services (2007), it was highlighted that practitioners gave three criteria for successful Six Sigma deployments as:

- Projects need to be focused on the organisational objectives.
- Projects should be undertaken well, using good quality people applying sound project management techniques. The outcomes of projects should also be evaluated.
- Projects should be undertaken in the right environment. This is about leadership, recognition, encouraging people to do the right thing effectively and putting control in place to avoid slipping back into old ways.

5.8 Success Factors specific to BPR

The important BPR success factors identified in the literature belong together in five separate sub groups, of which focusing on the first two factors is of particular critical importance (Do Carmo Caccia-Bava et al., 2005, Thong et al., 2000):

- Cross functionality of the project team and located as close as possible to the processes to be reengineered to increase opportunities to observe and understand the processes.
- The process used by the project team to implement the BPR project needs to be approved so that resistance to change is minimised.
- The expertise available to the project team regarding the process being redesigned/reengineered. A rapport should be built between the project team and team whose process is being engineered so that validation and acceptance ensure accuracy and conformance.
- The quality of the IT support extended to the project. However only essential changes should be made to the IT architecture so as to avoid any undue risks associated with completely new systems.

Regarding the critical success factors for implementing BPR in a large public sector organisation McAdam and Donaghy (1999) identified through staff perceptions that many of the issues and success factors that need to be considered are 'soft' human issues. From their analysis they reported that all grades of staff considered top management understanding of BPR and their support and commitment to be most important success factor. Other important factors included; staff empowerment; communication; the creation of a BPR team; organisations readiness for change and the need for a more customer focussed organisation (McAdam and Donaghy, 1999).

5.9 Success Factors specific to the other Process Improvement Methodologies

Comm and Mathaisal (2005) report that undertaking successful benchmarking projects implies that learning must occur between organisations. For this to occur requires supportive management teams, access to other organisations who have experienced similar problems and experienced and knowledgeable benchmarking teams.

Jackson (2000) lists the requirements for success as expert facilitation in EFQM implementations to include; developing team leaders to manage quality, an openness to learn from others, a recognition of the need for phase development and continual review.

6

Barriers to Implementation



This section highlights the barriers to business process improvement that have been identified in the literature. Initially it includes general barriers across all methodologies before presenting the barriers that have been reported as being most significant to the public sector.

6.1 General Barriers to Implementation

- Many of the barriers identified and reported in the literature can be considered to be the ‘opposites’ of the readiness or success factors. For example, the lack of leadership, poor communication strategy, no sense of urgency, lack of methodology, little monitoring and evaluation of outcomes, little consultation with stakeholders, poor engagement with employees, under resourced implementation team and a lack of support from HR policies (Lucey, 2005; Oakland and Tanner, 2007; Radnor et al., 2006; Radnor and Bucci, 2007).

Regarding Lean implementation in particular the emphasis within the literature regarding barriers appears to be around ‘cultural’ issues of leadership, management and employees (Manos, 2007; Port and Barker, 2005; Radnor et al., 2006):

- Organisations need to have the commitment and discipline in place to implement change resulting from implementations.
- Resistance to change, lack of the necessary skills, capability and experience of Lean, staff shortages and lack of managerial commitment. These may result in some nervousness in undertaking change. 64% of organisations in the survey of Scottish public sector organisations highlighted these barriers.
- Not waiting for people to be ready for Lean events. By scheduling events, managers will become proactive in implementing change.
- Employees not believing that improvements from events are true or will be sustained.
- Industrial relations may become strained through the changes and improvements caused by Lean practices. There is a need for managers to create trusting and open communication with trade unions.

There are a variety of reasons why some Six Sigma deployments fail. These are mainly concerned with not aligning objectives to customer needs, a lack of training and issues concerning project implementation (Gijo and Roa, 2005; Goodman and Theuerkauf, 2005; Sehwall and DeYong, 2003; Taner et al., 2007). Gijo and Roa (2005) and Goodman and Theuerkauf (2005), amongst others, highlight the importance of the project management within Six Sigma implementation:

- Management priorities and objectives will have to respond to customer requirements and are therefore crucial to the selection of projects. Not selecting projects in line with organisational goals and objectives leads to different expectations of the outcomes of the projects.
- Changes in organisational structure or in senior management may also impact upon the selection of projects and may lead to some projects being discontinued.
- Many organisations undertake several implementations/projects simultaneously and therefore employees cannot devote enough time to the successful implementation of any one initiative.
- There may also be a lack of coordination between functions involved in projects, leading to improper selection of quality criteria, incorrect data, analysis and solutions and possibly to resistance to further implementations.

- The inability to spare employees for training in Six Sigma methodology or equipment for trials due to the usual business pressures is a major barrier to implementation. The Belts used on the projects should have the technical and managerial skills to understand and implement tools, techniques and methodologies and be able to coach other members of the team. Their selection is vital in successful projects.
- There can be too much emphasis on improvements in many areas rather than prioritising a few vital areas and undertaking implementations in these. This impatience to get quick results may lead to short cuts in projects and may lead to failure in capturing the benefits of implementations. Additionally projects must be supported by correct data gathering and analysis. Sometimes the relevant data may be difficult or expensive to collect and it may be subject to customer variability. The frustration of people to collect data may hamper progress.

Additional barriers to the successful implementation of Six Sigma (Antony et al., 2007; Chakrabarty and Tan, 2007; Taner et al., 2007) particularly in the service sector include, the initial investment in training the Belts, a struggle to identify processes which can be measured in terms of defects per million opportunities, data being too difficult to collect and not readily available, processes are often described as activities, difficulty in distinguishing between service process and sub processes and, overcoming the psychology of workforce in order to get them to use the business language and not statistical language.

Guo (2004) reports on why reengineering often fails, highlighting that as much as 70% of BPR fails due to the lack of leadership in dealing with work processes, performance measurement and skills requirements. In addition, he comments on how typically in healthcare organisations the emphasis was on first and second wave initiatives that only focused on functional improvements. *“These changes led to even greater fragmentation, compartmentalisation and specialisation – rather than reengineering the system, with management focussed on improving individual processes”* (Guo, 2004).

Obstacles to successful benchmarking include resistance to change in organisations because senior managers or departmental heads feel that they cannot learn from others or do not accept the validity of the information they are being provided with. This can be compounded by a lack of communication of information throughout the organisation and a lack of time and staff resources to undertake benchmarking. Additionally, in a competitive environment or in an environment where data is not readily available, access to this information hampers effective benchmarking (Comm and Mathaisal, 2000; Dolan, 2003).

Woodard (2005) reports that although TQM in healthcare has had some successes, *“the gradualism and constant attention of implementation can make the approach unappealing.”*

Section 3.5 noted how writers including Seddon (2005) and Seddon and Caulkin (2007) state that the greatest barrier to the implementation of process improvement methodologies is the methodologies themselves and, how it is the lack of understanding of Systems Thinking which is the main issue. As Seddon and Caulkin (2007) point out there is *“the need to consider the parts not on their own, but in relation to the whole. The poor results of managing the parts rather than the whole – of not using Systems Thinking, in fact – are perhaps most familiar in service delivery, irrespective of whether public or private.”*

6.2 Public Sector Specific Barriers to Implementation

In general barriers to the successful implementation of business improvement techniques in the public sector include (Radnor and Walley, 2008; Radnor and Bucci, 2007):

- Public sector culture.
- A lack of clear customer focus.
- Too many procedures.
- Employees working in silos.
- Too many targets.
- A lack of awareness of strategic direction.
- The general belief that staff are overworked and underpaid.
- A lack of understanding of the effect of variation, Systems Thinking and process flow.

Through the literature analysis some of these points have been expanded upon and additional ones noted:

- The professional versus managerial role within public services.
- Not understanding the process at either the front line or across organisational boundaries.
- The transient nature of political leadership.
- Lack of resource and/or investment to fully implement the improvement methodology.
- Improvement methodologies are seen as Manufacturing initiatives with little relevance for the public sector.

6.2.1 Public Sector Culture and Structure

The political and financial environment public sector organisations operate in can have adverse effects on change programmes. An example given by Blair et al. (1998) includes a public sector manually based service, whose need for change arose out of low customer satisfaction due to inefficient processes clogging up the supply chain. However technical, financial and political restraints led to only a hybrid version of the old and new system being implemented. Political issues meant that, even though employees felt that they were not 'being done to', they still had vested interest in preserving as much of the status quo as possible and suggested modifications were conservative (Blair et al., 1998).

The sectoral specific issues can impact upon the success of implementations in the public sector. McNulty (2003) notes that across public sector organisations as a whole, policy is focused on the macro level and undertaken by managers, whereas practice occurs at the micro level by professionals (e.g. clinicians, academics etc). He describes how professional work is broken down into specialities that very rarely cross departmental boundaries. Additionally professionals control the flow of work and are therefore very powerful and can resist managerial attempts to make their work more predictable, transparent and standard (McNulty, 2003).

Within healthcare, this barrier causes a conflict between the culture of efficiency and the culture of caring. Clinical buy-in to adopting business improvement can be difficult because of resistance in being told how to do things or because they are uninterested in process improvements across departments (Caldwell et al., 2005; Wysocki, 2004). This is especially the case with BPR which can involve aggressive rhetoric to achieve breakthroughs (Woodard, 2005). Clinical buy-in is critical, as clinicians have a strong power base within hospitals and have the credibility to convince colleagues that improvements can benefit patient care (Caldwell et al., 2005; Massey and Williams, 2005; Guthrie, 2006). A way to overcome this type of resistance is to work with clinicians and other opposers, develop trust with them, use clinicians with influence as champions, keep everyone in the information/communication loop and seek quick win-win projects. Eventually many will change their opinions (Caldwell et al., 2005; Lodge and Bamford, 2007).

Returning again to the ideas within Systems Thinking, Gullede et al. (2002) point out the mandates and structure of the implementation of improvement methodologies are based on traditional 'command and control' structures. Seddon and Caulkin (2007) support this by saying *"today's public services are run on a quintessentially centralised, command-and-control model."* Both Gullede et al. (2002) and Seddon and Caulkin (2007) suggest that this structure means that process improvement cannot be effective as frontline staff react to the managers, measures and targets rather than the customers. Therefore, demand data and variation are not fully understood.

6.2.2 Lack of Understanding of Variation

As mentioned in section 4.3, in healthcare as with many other public services, there is a lack of understanding regarding the relationship between capacity and demand and also the need to manage variability.

The delivery of patient care is largely a human process and the causes of variability are often difficult to quantify. There is a need to better understand how patient demand varies and to remove activities that do not add value to the patient or create bottlenecks in the system. This includes getting patients from emergency departments to theatres more quickly by removing unnecessary paperwork and reducing the number of different staff involved and, improving the layout of hospitals (Lister, 2006). As section 4.3 points out another effective way to reduce the queues is to manage the variation rather than increase the capacity. This can be done by reducing the number of steps in the overall process and introducing systems buffering between different departments (Mango and Shapiro, 2001; Walley et al., 2006).

6.2.3 Lack of Focus on Customer and Processes

There are also issues surrounding what quality is and how to define it within a healthcare environment. Endsley et al. (2006) refer to technical quality as the competency of providers and accuracy of proper procedures. Whereas customer satisfaction relates to respect for opinions and views, empathy, reliability, responsiveness, communication, continuity of care, involvement of family and friends and observing patients perceptions of quality.

Challenges to implementing Lean in government organisations include; no guarantee of top level ownership of processes as political leadership can be transitory, top level managers may have very little understanding of front line processes and there is no one definition of who the customer is and what their requirements are (Krings et al., 2006).

Proudlove et al. (2008) summarise that *“of particular significance to Lean are the difficulties in identifying customers and processes in a healthcare setting and the use of clear and appropriate terminology.”* As with Lean, the lack of ownership of process in the public sector can act as a barrier to BPR. Getting consent to change externally owned process is a huge task and can involve collaboration with many stakeholders. Also it is difficult to specify value in the public sector because some organisational functions and procedures do not contribute to value in the eyes of the customer (Halachmi, 1996).

Denison (1997) describes the ideal type of ‘process-organisation’ as one *“wherein the primary issue of organisational design is creating value and organising is understood not as a series of functional units or business units but as a collection of interrelated processes that create value.”* However, often in public services managing business processes across organisational functions can be difficult, because of departmental working and a lack of alignment between business processes and IT (Gulledge and Sommer, 2002). Also NAO (2007) report how the lack of understanding of the process and how inputs affects outputs can be a risk to further potential improvements in a Central Government environment (NAO, 2007). For healthcare Walley and Silvester (2006) give two main reasons for delays – too many steps in the over-all process and incompatibility of the adjacent stages.

6.2.4 Low Levels of Investment

In evaluating BPR implementations MacIntosh (2003) has noted that in public services *“too many resources may be required and as a result corners may be cut.”* In comparing resources available to fund BPR implementations he outlined huge difference between the public and private sectors. This ranged from private sector spending of millions of pounds to buy the required equipment to a lack of financial resources in the public sector in order to implement the required solution (MacIntosh, 2003). Within HMRC the level of investment and resource allocation was high throughout the Lean implementation (Radnor and Bucci, 2007a).

Smith (2003) notes that the investment in training is critical. *“Champion training requires time and commitment but is a necessary part of culture change. Champions can become Black Belts, with enthusiasm for promoting change”* (Smith, 2003).

6.2.5 Process Improvement Methodologies only suited to the Manufacturing Sector

Bane (2002) reports how there is a perception that Lean, Six Sigma and other improvement approaches are manufacturing based and so are not applicable within the specific public sector environments. He, amongst others, suggests that *“leaders in public sector organisations should study how other organisations, both within and outside of their sector are successful applying Lean, Six Sigma, and other leading edge approaches. They should realise that to see the best practices they have to look beyond the manufacturing-type labels at the underlying concepts. Through conferences, publication, and networking, public sector organisations can learn how the underlying concepts can be successfully implemented in their organisation”* (Bane, 2002).

7

Impact: Outputs, Outcomes and Measures



This section outlines the impact of the business process improvement methodologies focusing on their output, outcomes and measures. It begins by outlining the benefits that can be expected or have been obtained from Lean, Six Sigma and BPR implementations. It then focuses on public sector impacts by giving examples that have been reported within the literature. The final two sections summarise highlighting, what impacts can be measured and audited.

7.1 Benefits of Implementation

Womack and Jones (2006) highlight that through Lean implementation organisations can expect results such as a doubling of labour productivity, cutting throughput times and inventories by 90% and that errors reaching customers, scrap, time to market and developing new products/services will be cut in half. All these should be achieved within two to three years. Through Six Sigma deployment, the main quantifiable benefit to be expected is the reduction in product or service defects (Antony et al., 2007).

In addition, benefits that have been realised through Lean implementations and Six Sigma deployments (Antony et al., 2006; Dedhia, 2005; Chakrabarty and Tan, 2007; Hasenjager, 2006; Sohal, 1994) include:

- Consolidation of product/service lines and departments. This leads to more standardisation of processes and procedures, reduced variability in process performance, flatter management structures and more flexible processes.
- Decreasing work in progress by removing bottlenecks and making work flow smoothly. Productivity increases will result due to the reduction of waste, allowing organisations to run at capacity, reducing costs and defect rates.
- Moving products faster will lead to less inventory of raw materials and finished products. Work can be done within the required time and thus cycle time is reduced.
- Increased capacity and output leading to more on time delivery of services/products thereby increasing customer satisfaction as they receive an improved and more consistent level of service.

Many reported outcomes focus on how both Lean and Six Sigma increases employee morale through more empowerment, more cross functional teamworking and increased awareness and time for problem solving using appropriate tools and techniques (e.g. Antony et al., 2007; Antony, 2006; Hasenjager, 2006). Manos (2007), however, note that *“the human elements are just as important as the measurable elements and have more lasting and important impacts. Unfortunately many managers focus solely on the measurable benefits without considering feelings, work styles or other intangible benefits.”*

Manos (2007) reports the benefits obtained from using the tools of Lean such as Kaizen events include:

- The quantitative benefits are measurable results used to show management specific improvements and include savings in time and money, less people required, reduced lead or cycle time, fewer steps in the process, reduced inventory, improved right first time statistics and definition of value and non value elements.
- The qualitative benefits are more difficult to measure. Typically they include better employee morale, better layout of processes and being able to find things easier.
- People generally enjoy the teamworking elements of Kaizen events and this usually contributes to knowledge transfer between individuals from within and across departments. This also leads to changes in attitude and outlook.
- By seeing immediate benefits from Kaizen events, people will appreciate that Lean does work and will understand that they can influence improvements.

In support of this Smith (2003) found that employee satisfaction was directly related to participation in Kaizen events, inspiring change in workplace culture because teams saw immediate results of their efforts. From a survey of employees who had taken part in more than 6 Kaizen events, 20% were more favourable towards the company than those who had not participated (Smith, 2003).

This was supported in the Scottish Executive evaluation where one case study interviewee reported that *“Kaizen provides a way of making improvement manageable by cutting problems into bite-sized chunks. Kaizen works because it is a process which delivers quick and visible”* (Radnor and Walley, 2008). Also McNichols et al. (1999) conclude in reporting on the use of Kaizen in hospitals that the approach *“can be applied to products and services with dramatic results in a very short time frame.”*

Mansar and Reijers (2007) carried out a survey of 91 BPR practitioners to assess what the top ten best practices were, whether these best practices were actually being adopted in BPR projects and whether they were delivering benefits. The top ten best practices were highlighted as:

- **Eliminate tasks:** Remove unnecessary tasks from a process.
- **Composite tasks:** Combine smaller tasks and divide larger tasks.
- **Technology:** Eliminate physical constraints by applying new technology.
- **Empower:** Give front line workers decision making authority.
- **Order assignment:** Workers perform as many steps as possible for single orders.
- **Behaviour view:** Moving tasks to more appropriate places.
- **Organisation:** Whether to make resources more specialised or more general.
- **Customer:** Consider integration with a customer’s/supplier’s process.
- **Behaviour:** Decide whether tasks can be done in parallel.
- **Organisation:** Reduce the departments, groups and persons in the process.

The survey highlighted that the best practices had impacted upon quality, cost, time and flexibility of the business process. Specifically, technology impacted on quality, task elimination impacted on cost, integration impacted on time and empowerment impacted on flexibility (Mansar and Reijers, 2007). Mansar and Reijers (2007) therefore suggest that these should be used as starting points for the application and applicability of the best practice, e.g. if quality is the main purpose of a BPR project, then technology should be considered first.

Finally, Comm and Mathaisal (2005) describe that effective benchmarking and the adoption of best practices from other organisations can result in productivity gains, qualitative benefits, lead time gains customer satisfaction and improved safety.

7.2 Public Sector Specific Impacts

The evaluation of Lean implementations in Scottish public sector organisations highlighted the following tangible outcomes (Radnor et al., 2006, Radnor and Walley, 2008):

- Improving service performance in failure demand from 82% to 15% in four weeks.
- Improving processing times by two thirds in one local government department.
- Achieving more work in less staff time.
- Bringing services up to a standard.
- Reduction in staffing and costs of 105 person reduction in manpower and £31m budget saving in 10 months.

Some intangible outcomes were also highlighted from this work delivering benefits to the customer, the organisation and the staff, including (Radnor et al., 2006; Radnor and Walley, 2008):

- Process change to speed up the process.
- Culture change to focus on customer requirements and encourage joined-up working.
- Greater focus on prevention rather than correction of errors.
- Support for the development of a culture of continuous improvement.
- Greater understanding of the whole system and how it fits together.
- Better understanding of the needs of the customer.
- Improved performance measurement and use of data to manage performance.
- Greater staff satisfaction and confidence in themselves and the organisation.

Bhatia and Drew (2006) report that, for public service organisation the results of a Lean implementation should lead to a reduction in lead time, reduction of backlogs and improved productivity and turnaround times.

The following are a selection of examples, focused on various public services, that have been obtained directly from the literature, demonstrating the impact, benefits and issues that have been reported from business process improvement programmes. In some cases as well as the outputs and outcomes reported the implementation process is also briefly described.

7.2.1 Central Government

HM Revenues and Customs (HMRC) implemented Lean in its Processing Directorate (Radnor, 2010).

The Capability Review (2007) stated that Lean had *“delivered headcount savings of nearly 2,500 full-time equivalents and had increased productivity by up to 50% and quality by an average of 40%.”* Radnor and Bucci (2007) describe how Lean had affected the tools structures, practices and behaviours used in the organisation. Lean had an impact on quality and productivity, made processes and practices clearer and led to new ways of working. However it also led to uncertainty and anxiety amongst staff. The main impacts noted were:

- A direct correlation between the engagement of senior management teams and front line attitudes towards Lean.
- A directorate wide increase in the quality of work produced.
- A more structured approach to problem solving in some sites.
- More informed and accountable managers, many of whom were now becoming more visible to front line staff.
- An increase in teamworking with team members now interdependent upon one another (Radnor and Bucci, 2007).

The Ministry of Defence (MOD) significantly changed logistics support for fast jet by creating repair hubs on main operating bases and used Lean practices to improve the efficiency of the repair process. The results in terms of cost and performance was a fall in the cost of support from £711 to £328 between 2002 and 2007 and the reduction of manpower by 21% (for one aircraft) required to support repair. There has also been a reduction in the time taken to reduce repairing some types of aircraft (NAO, 2007).

The Florida Department of Revenue had to generate business results focusing on business process review. The outcome was the reengineering of up to 22 computer systems to create a single integrated tax administration. This initiative generated \$321.8m return on \$64.9m investment over 6 years (Weeks, 2006).

The Housing Development Board (HDB) in Singapore undertook BPR for the branch offices, which had multiple layers of authority. Customers had to go from office to office to handle enquiries, one quarter of phone calls went unanswered and the press reported queues of 200 people waiting more than five hours to be seen. After the BPR project a one stop service was provided merging five specialist counters and seven new information systems were developed. The waiting time reduced by 97%, unanswered calls dropped by 85%, the backlog of cases dropped 85% and staff morale increased (Thong et al., 2000).

TQM and BPR approaches were used with technology in an endeavour to improve business processes in a large public sector organisation. Initially the implementations pursued the benefits of reducing waste in service processes and found that significant gains in productivity (75% or greater reduction in time require for accessing and taking action on information) and customer satisfaction were demonstrated (95% increase in respondents indicating satisfaction with the new processes). However, attempts to extend the gains by the application of BPR across the wider organisation found that comparable benefits were not realised. Major impediments include conflict between organisational structures and strategy, and lack of direct business imperatives with respect to change (Dean, 2000).

7.2.2 Local Government

Implementation of Lean principles in a social housing setting in local authorities in Leeds, Preston and the Tees Valley achieved efficiency gains of approximately £200,000. Actual cost savings were estimated to be £180,000. These efficiency gains arose from the use of a methodology that identifies, categorises and removes waste. The specific results from the pilots were (ODPM, 2005):

- The end to end repair time was reduced from 46 days to 5.9 days and customer satisfaction following repairs showed that 90% rated the service 8 out of 10.
- For rent collection for new tenants, the first payment on the account was reduced from an average of 34 days to 20 days. And only 18% of new tenants fell into arrears compared to 43% previously.
- For housing, the process steps were reduced from 64 steps to 32 and the void re let time was halved reducing estimated void loss to an £90,000.

Examples of the quantitative benefits of Lean in local government, police and fire services include; halving the end-to-end time for planning applications, halving the time for voids, cutting end-to-end time for high demand adaptations from over 200 days to 12 days, payroll errors reduced from 75% to 2%, reducing backlog in lost and found by 80% and reducing report production from 77 to 6 days in the Justice system (Seddon, 2004).

George et al. (2003) report that the EFQM model led to the following benefits in the Technical Services department of Stirling Council:

- A better awareness and understanding of the need for continuous improvement in order to meet both current and future challenges posed by best value.
- A recognition of the inclusiveness of projects which should aim to include everyone through briefings, questionnaires and training.
- A better understanding especially from front line staff, of the work of other departments and how they all fit together.
- An acknowledgement by managers that a systematic approach to continuous improvement provides value.
- An appetite for learning new skills and of discovering hidden skills.

The Connecticut Department of Labour aimed to eliminate waste in its processes and delivery of services using Lean techniques. In the pilot phase, four trained teams successfully applied Lean to the contract invoicing processes procurement procedures. The results were 119 steps eliminated, redesigned, or automated; 1,181 cycle time hours eliminated, redesigned, or automated; 33.5 staff hours eliminated, redesigned, or automated on a unit basis for four processes and more than \$500,000 in staff time saved over the course of a year. Across the whole Lean project 3,380 staff hours were eliminated and \$151,000 in staff costs were saved over the year and reinvested, \$13,200 were saved in material costs as well as quicker process time, empowered staff, enhanced communication and time freed to tackle other processing issues (Hasenjager, 2006).

The Local Government of Cincinnati, Ohio (USA) modified the culture of their organisation with Lean techniques for process improvement. At the end of the process, there had been 63 process redesigns and 48 continuous improvements. Two of the process redesigns were in the police recruitment service and sanitary sewer easement process. These resulted in millions of dollars of cost savings and greatly improved public service in the city (Krings et al., 2006).

7.2.3 Healthcare Services

As indicated in the introduction, many of the writings accessed reported the implementation of business process improvement methodologies in healthcare both in the UK and overseas (mainly the USA). Lean projects in health care have become widespread. Brandao de Souza (2009) reflects on the existing literature regarding Lean healthcare applications and reports that most have occurred in the USA (57%), with the UK growing at a fast pace (29%) followed by Australia at 4%. A selection of examples presented is structured around the various methodologies.

Lean:

- Reporting on the success of Royal Bolton Hospital in the UK the Chief Executive David Fillingham reported that *“Lean can be used to remove the number of steps in a process, and has the potential for powerful soft benefits such as inspiration and encouragement of nursing staff resulting in all round improved patient experience”* (Fillingham, 2007).
- Outcomes from Lean implementations in the health service in Scotland included improving customer waiting times to first appointment in the health sector from an average 23 to 12 days and improvement of customer flow time for patients of 48% (Radnor et al., 2006).
- As of March 2003 emergency departments in the UK had to treat, discharge or transfer 90% of patient arrivals with 4 hours. This target was not being met and a project was undertaken to improve care, staff satisfaction and variability in the treatment process. The project involved understanding the nature of demand volumes and seasonality, clustering patients in segments of similar processes, identifying the process flow of each patient, designing the process flow, testing new flow for delays and assessing results and implementing improved processes. The study was conducted at 11 sites and included every aspect of the emergency care system from first point of contact to discharge. The results were improvements in hand over time for patients, reduced variability through a centralised diagnostic process, reducing the number of stages to two (reception and combines assess, treat and discharge), increased capacity by lower queuing time, increased nurse led diagnostics and single stage treatments to increase patient flow (Walley, 2004).
- A UK hospital case study addressing the challenge of meeting Government targets, in particular the requirement that by 2008 the maximum wait from GP referral to the patient receiving first treatment should not exceed 18 weeks. The development and implementation of an intranet based waiting list module brought about greatly reduced waiting times. The waiting list was developed out of an application of Lean principles and techniques; process mapping, demand analysis, capacity analysis and flow (Lodge and Bamford, 2007).
- Rapid improvement events at NHS Trusts in the UK have provided quick results. The Royal Bolton Hospital staged Rapid improvement events where employees brainstormed process improvements. The result was that the death rate for patients fell by a third. Also the time taken to process important categories of blood fell from one day to three hours (Guthrie, 2006). The Royal Devon and Exeter Hospital Trust also used Lean techniques to remove waste from its back office helping it to meet financial targets (Guthrie, 2006).
- Gubb (2009) cites achievements of Flinders Medical Centre in Australia who after two and a half years of implementing Lean Thinking was doing 15–20% more work, with fewer safety incidents, on the same budget, using the same infrastructure, staff, and technology. The same author cites Royal Bolton NHS Foundation Trust having reduced its average turnaround time in pathology from over 24 hours to 2–3 hours using less space and fewer resources (Gubb, 2009).
- The Nebraska Medical Centre adopted Lean principles to redesign the work area in the sterile processing centre to eliminate bottlenecks and reduce staff walking by 167 miles a year. Lean was used in the clinical laboratories to reduce lab space by 825 sq ft and reduce specimen processing turn around time by 20%. It reduced manpower by 11 Full Time Equivalents (FTEs), who were redirected to other critical work. Customer service was also improved. Patients are now regarded as guests. Patients and their families can order what food they want, when they want from a menu of 250 items.

Service is available 24 hours a day. This has led to increased utilisation of the service. Food is also available for staff between 10pm and 4am, thereby supporting commitment to staff. The Medical centre improved the efficiency, effectiveness and outcomes of its service delivery. It learnt that financial challenges can be dealt with in better ways than the traditional methods. Importantly for the patient the average length of stay has decreased from 6.29 days to 5.72 days during a five year period (Fosdick and Ellen, 2007).

- The Pittsburgh General Hospital used Lean techniques to cut infections. The hospital traced problematic infections in some patients to their source, prompting two intensive-care units to change the way they insert intravenous lines. The result: a 90% drop in the number of infections after just 90 days of using the new procedures. The new procedures have saved almost \$500,000 a year in intensive-care-unit costs. However the transfer of this experience across the hospital has been slow (Wysocki, 2004).
- A major cause of high waiting times in the NHS is the variation between capacity (appointment slots available) and demand (referrals). A case study of City Hospital in Birmingham focused on trying to better understand capacity variation. By reducing variation in clinic capacity and by moving to more frequent, shorter clinics, the hospital provided a better service for patients. Even though the average weekly demand went up following the change, the average weekly capacity went down (Silvester, et al., 2004).

Six Sigma:

- Six Sigma projects are designed to reduce error rates to a maximum of 3.44 errors per million through statistical analysis techniques. The typical healthcare organisation has error rates between 67,000 and 309,000 per million opportunities (Harrington, 2005). Typical improvements that can be achieved using Six Sigma include reduced length of stay, reduce time to enter the health care system, reduced efficiency and increased efficiency in billing systems. Examples of the impact of Six Sigma in healthcare include the reduction of medication errors and laboratory errors and therefore improving patient safety and reducing profit margins significantly in a community hospital with an estimated saving of more than \$1m per year (Antony and Banuelas, 2002).
- The Mount Carmel Health system in the US undertook Six Sigma projects in claims processing, discharging in the emergency department, implementing a procedure based delivery system in the surgery area, enhancing clinical documentation and making lab results available according to the clinicians needs. The results of the projects were a financial return of \$3.1m and increased employee and clinician satisfaction, who now seek to proactively fix problems (Sehwall and DeYong, 2003).
- A Lean Six Sigma project at a mid size US hospital witnessed a 55% fall in medication errors. There were also estimated labour costs savings of \$550,000. Qualitative improvements included better patient satisfaction and improved employee morale and relationships between nurses and pharmacists (Esimal, 2005).

BPR:

- A sample of 192 hospital administrators was undertaken to determine the success of BPR in the United States. The results were that approximately one half of 300 reengineering projects in North America were not meeting their goals. Specifically, many managers said that the actual project benefits fell short along the dimensions of customer service, timeliness, quality, cost reduction, competitiveness, improved technology and revenues (Do Carmo Caccia-Bava et al., 2005).
- The more recent BPR implementations in healthcare appear more successful but the change process is far from easy and many projects have turned into learning experiences about how organisations should/not manage major change. However total benefits from the BPR implementations are moderate. Ultimately the results indicate that from a user point of view (patients and doctors) satisfaction from the reengineered processes and increased hospital profitability have only been derived to a minor – moderate extent (Jackson, 2000).

7.3 Measuring the Impact of Implementations

In summary the impacts reported in the examples in section 7.2 illustrate that they can be quantitatively measured in terms of Quality (e.g. number of errors, defects), Time (e.g. processing time, waiting time) and Cost (e.g. savings). Qualitative impacts were often mentioned in terms of customer satisfaction and employee satisfaction or morale. In other words impact was measured in terms of output and outcome. However, there were no articles read or could be found which reported 'value for money' measures. Only a few described any form of evaluation or performance measurement system that was implemented to monitor the impact of the process improvement methodology during its implementation. It appears that the majority of articles read focused mainly on service and public service organisations, and that the savings captured and reported were as a justification for the process improvement methodology implementation.

A recent piece of benchmarking carried out on behalf of HMRC surveyed 35 companies and included questions on impact measurement. The report on this survey noted that, *"Perhaps the most significant finding of this screening report is the difficulty organisations have providing performance measurement data, especially in the areas of lead time and value for money"* (Tanner et al., 2008). This supports the finding of the literature review.

One publication by Porter and Barker (2005) did offer a solution to quantification during implementation and adjustment in relation to quantifying time saved as a cost saving. They suggest a tool called 'Time Based Analysis' which can be used by taking data relating to the supply chain, internal value adding operations and all associated costs, and then display them in a graphic format. Activities above the horizontal time axis are 'positive' value adding, which the customer is willing to pay for and those that are necessary to convert inputs to outputs, irrespective of what those inputs and outputs may be. Activity below the horizontal time axis is non-value adding. This can include queue time, waiting time and the overhead costs, which increase when there is an increase in calendar time gaps in any process. Porter and Barker (2005) argue that *"this graphical representation can highlight time gaps and value adding elements in the value chain and see how groups or individuals can impact the overall system capability."*

Kollberg and Dahlgaard (2005) recognise that an important phase is to design a performance measurement system when implementing Lean in an entire organisation. They present a measurement system called 'The Flow Model', which makes it possible to follow a patient's path through the healthcare system by capturing eight measures, all of which assess a certain date or time in the patient care chain. The model aims to support reducing long waiting times and delays by identifying bottlenecks and improvements potentials in the patient flow process. However, as Kolberg and Dahlgaard (2005) note *"the flow model needs to be balanced with other measurements in order to receive a complete picture of organisational performance using Lean. This includes policy deployment, patient satisfaction and continuous improvement."*

7.4 Auditing Business Process Improvement Impact

In order to assess and evaluate the ongoing impacts and improvements, an audit of the business process improvement technique may be required. Audit is the fifth S in the 5S tools and so as such, particularly within Lean, auditing is encouraged as a means of sustaining the process improvement technique. In terms of auditing the impact of the technique few articles actually described a method to carry this out. Three are reported here – Hammer (2007) which is based on an article in the Harvard Business Review, one reported by NAO in a value for money study and another from the Unipart Group of Companies based on a approach developed as part of the 'Unipart Way'.

Hammer (2007) described an audit tool based on enablers and capabilities for organisations to assess their 'level' of maturity (4 levels in each one) in order to address gaps to allow the implementation of sustainable process re-design. He calls this 'The Process and Enterprise Maturity Model (PEMM)' and, the characteristics of the enablers and capabilities needed for processes to perform well and sustain performance are described to be:

- Process enablers: process design, abilities of the people who operate the process, appointment of top-level process owners to oversee the processes implementation, match between information and management systems and process needs, quality of the metrics that the company uses to measure process performance.
- Enterprise wide capabilities: senior executive support focus on processes, their employees greatly value customers, teamwork, and personal accountability, they employ people who know how to redesign processes, and they are well organised to tackle complex projects.

Hammer (2007) argues that *"unless all the capabilities are in place across a company, it will be impossible for the organisation to institutionalise the enablers and sustain the performance of its processes."*

The NAO itself has reported upon a MOD projects on transforming the support function for fast jets. Within this report a matrix (audit tool) is provided for assessing the level of transformation maturity against a target. The targets assessed against are frontline confidence, readiness and sustainability, capacity in Lean techniques, through life management, end-to-end, optimisation of industry, identification and deployment of innovative ideas, change management, benefits management, programme management and people skills (NAO, 2007).

Unipart have developed a tool for assessing performance and continuous improvement of experts (people) and locations (Unipart, 2007).

- A location assessment monitors the progress of a location as Lean is implemented and continuous improvement is embedded. A standard method of assessment enables a comparison of results between sites and allows best practice at each site to be shared with others leading to improvements for the customer.
- A central team undertakes the assessments to ensure a consistent approach. Assessments are undertaken once a year over a one or two day period. The tool requires assessors to go and see Lean processes and talk to team members. They also interview team members at all levels.
- The key elements of the assessment are dependent on the number of processes. However the main elements include assessments against leadership, staff involvement, expert capacity conformance of all processes, KPI performance, sustainment and workplace environment.
- For each element, a score is allocated between 10 (representing the start of the journey) to 0 (the best possible score that can be achieved). For each score there are detailed check and test questions. The set of sources against the criteria provide a route map with it an expectation that it can take two to three years to achieve a good score.
- The results are presented to managers using a graph in order to compare current and previous assessment, thereby providing evidence of progress.
- Assessors make recommendations about the steps that are required to improve performance. Action plans to implement recommendations are produced and implemented.



Sustainability



Comm and Mathaisel (2005) define sustainability to be “*the strategic deployment of resources to allow the (organisation) to continue to economically thrive and focus on its core mission.*” Based on this sustainability related to business process improvement implies an organisation wide acceptance and adoption of new working practices that are allowed to thrive in order for continuous improvement. This implies learning key lessons internally and externally, recognising which specific methodology to use and what the important aspects for ensuring that successful changes become embedded in the organisation.

This section begins by presenting what publications have outlined as the important elements of sustainability and also how sustainability can be achieved. Although, it should be noted that, like measurement systems, the number of publications within this topic were fairly limited. A number of authors suggest that a combined approach of the methodologies is a good way to achieve greater impact and also to allow sustainability. Therefore section 8.2 explores the relationship between the various approaches.

8.1 Achieving Sustainability

Authors including Lucey et al. (2005), Manos (2007), Oakland and Tanner (2007) and Proudlove et al. (2008) suggest that, improvements from Lean and Six Sigma implementations, over the medium to longer term involves:

- Standardising processes to the new improved level.
- Training everyone involved to the new level.
- Measuring how the employees engage with the company and with the customer.
- Monitoring the results over time.
- Securing commitment of management and assigning ownership to manage the intervention and maintain and improve the gains.
- Having external assistance and internal champions but also considering how to develop internal support mechanisms to create a sustainable approach to improvement more widely.

From the analysis of the implementation of HMRC, Radnor and Bucci (2007) highlighted some key lessons that ought to be considered to inform future Lean implementations:

- The tools and techniques are important and they have to be applied. However they are only a small part of the transformation required for change. There also has to be an approach to work and a management philosophy that recognises the need to work in a different way.
- Employees had to experience the change before they converted. At first glance, some of the concepts appeared complicated but when they were broken down into bite size chunks, and some training was provided, it was not complicated.
- Managerial commitment to implementation was essential. However the role of the middle manager was important in Lean implementations as their duties will alter and they need to become more responsible for auditing.
- Teaching people the tools and techniques is one thing, getting them to apply them in their working area is a big hurdle for people to overcome. This can be made easier with good leadership.
- Whereas implementation is quite easy, the long term sustainability takes longer.

An important aspect of Six Sigma is to revisit the original expectations for the Six Sigma projects selected and the short and long term impacts. Lessons should be learnt and the process should be readjusted to take on board these lessons (Goodman and Theuerkauf, 2005).

Some of these points are supported by Forrester (1995) who points out that in order to sustain Lean the implications on the human elements need to be carefully considered:

- Organisational style and structure, with the whole process becoming more people centred, and employees becoming more involved and working in motivated and accountable teams and the transformation of the leader's role to one of more empowerment. This creates flatter organisational structures focused on process and not hierarchies.
- Job role and selection of staff so that; selecting team leaders is based on a greater skills set including man management skills, team members have a collection of team responsibilities, the right employee is in the right position and performance management measures need to be introduced with every individual having clear performance targets.
- Replacing managerial development programmes with individual continuous development, competence based programmes, focusing on the skills individuals need and broadening the training available to team members to include different processes and techniques, training in continuous improvement allowing individuals to solve their own problems.

Womack and Jones (1996b) point out the importance of understanding the relationship between the principles of Lean stating that the first four principles of Lean *"all interact with one another in a virtuous circle."* This is important when aiming to achieve sustainability as all too often managers grasp some of the concepts and tools but as Womack and Jones (1996b) say *"they could hit individual notes (and loved how they sounded) but still couldn't play a tune."*

It is worth noting that Rees et al. (1996) outline that *"Lean ways of working are more fragile than traditional management systems because their success depends on a high degree of trust between the organisation and its workforce."* Importantly, Rees et al. (1996) suggest that *"Lean should then be seen in aspirational terms; as an ideal to be pursued not a system to be implemented. It should be considered as dynamic and a journey rather than a fixed point that has a no final destination."* The concept of a journey is an important one as other authors have suggested similar ideas. Parks (2002) specifies that it took Toyota 20 years to develop its system. Bale and Regnier (2007) highlighted how, in their experience, it took three years for basic stability to be achieved in their healthcare case study site and, Hines et al. (2008) suggest that in general Lean systems take between three to five years to develop and implementations can take between five to seven years.

Bateman (2005) reports that, sustainability is not a concept with only two states – sustaining and not sustaining. It can have a number of states in between that impact upon the level of improvement sustained over a period of time. For example, undertaking an improvement workshop can have a quick impact and result in improvement in an activity by 50% in the short term but *"this can reduce to zero if enthusiasm and momentum are not built upon"* (Bateman, 2005). She suggests that *"with follow up actions and post follow up actions, this can increase to almost 90% improvement over the longer period"* (Bateman, 2005). However, there are states in between these extremes where elements of follow up are undertaken over a period of time that contribute more or less to further improvement (Bateman, 2005).

In the same publication Bateman (2005) distinguishes between Performance Improvement (PI) and Continuous Improvement (CI) saying that PI can occur over a few months acting as a foundation for continuous improvement. However, in conclusion *"management sometimes expect CI to evolve out of PI without setting up a process for CI to occur"* (Bateman, 2005).

The issue of only focusing on RIEs in isolation is highlighted by Radnor et al. (2006) and Radnor and Walley (2008). They note that the 'quick wins' generated from the RIEs may be difficult to sustain because they are not easily integrated into the overall strategic objectives of the organisation. This again was supported by one of the case studies in the Scottish Executive evaluation where the link between the numerous RIE activities and strategy was weak indicated by the findings which noted the need to *"improve the link between strategy and continuous improvement, and clearly establishing RIE as part of a strategic improvement programme"* (Radnor et al., 2006).

As long as they are part of the strategy improvement programme RIEs themselves can be a powerful means to both engage the workforce and allow a number of small changes to occur which in combination allow a big impact and support sustainability. As Spear (2005) reports on Toyota *"People don't typically go for big, dramatic cure-alls. Instead, they break big problems into smaller, tractable pieces and generate a steady rush of iterative changes that collectively deliver spectacular results."* In the same article he reports on Virginia Mason Medical Centre (VMMC) where they have conducted hundreds of RIEs and have achieved *"dramatic improvements in quality, customer satisfaction, staff satisfaction and profitability"* (Spear, 2005).

Hines et al. (2008) suggest that what makes 'Lean stick' is *"having leaders that 'walk the talk' and implement effective measures and monitoring systems."* This is about 'leading the Lean lifestyle'. As Bhatia and Drew (2006) clearly state, even in public services, managers *"should spend a day a week walking the floor."* As mentioned, sustainability needs to be about the whole rather than application of individual tools and techniques. As Hines et al. (2008) report 'one step at a time' approach can be taken in order to deliver quick wins but *"once the message has got across you need to progress to more ambitious, long term projects."* Particular tools they cite as being important are visual management and regular process auditing (Hines et al., 2008).

Seddon and Brand (2008) argue that in order to sustain real change, particularly in service and public sector organisations, there is a need to move away from command and control structures. *"At the heart of the command-and-control philosophy is the notion of economies of scale... In the public sector this is manifest by the unquestioning belief in the idea of shared services structured around organisational functions rather than the flow of work."* (Seddon and Brand, 2008). He suggests moving towards a systems view where the focus is on *"economies of flow"; and in very many local authority services this means equipping the front-end of the service, the place that transacts with customers, with the means to absorb the variety of demand"* (Seddon and Brand, 2008).

Interesting, in the case study analysis of 5S projects in healthcare where Esain et al. (2008) noted both emergent and planned change approached they also noted a paradox in that *"change agents seem to unwittingly want to make the process neat by adopting the prevalent command-and-control organisational model of management which may restrain spontaneous change and learning. This could be resolved by ensuring that enthusiast converters and others judge the activity that they are proposing aligns with the vital few objectives of the organisation, but this assumes a clear strategic organisational vision."*

8.2 Combining Approaches

Section 3.5 briefly discussed how some authors have described the similarities and differences between the various business process improvement methodologies. Others suggest that a combined approach can help support effective implementation and sustainability of process improvement. This section will begin by returning to discussion on the similarities and difference between the approaches, particularly Lean and Six Sigma, before stating why some writers suggest a combined approach.

8.2.1 Similarities and Differences

Ferguson (2007) states that recognising the differences between Lean or Six Sigma means that returns can be maximised by knowing when to use which in the right context and environment. Ferguson (2007) outlines that:

- Lean is a philosophy, while Six Sigma is a programme.
- Six Sigma project teams exclude those not involved and the benefits accrued from projects are specific to departments. Lean is inclusive and involves the whole of the organisation.
- Six Sigma focuses on cost and quality. Lean focuses on business strategy, organisational design/structure, culture and processes of the whole value stream.
- Six Sigma focuses on specific goals and objectives, identifies root causes, tests hypotheses, validates the analysis and suggests recommendations. On completion of projects Six Sigma teams disband.
- Lean is about continuous improvement as there will always be waste in the process. Lean is ongoing and in the new learning organisation, employees are continually building their skills and improving. Lean becomes part of their daily working lives.

Proudlove et al. (2008) explain that *“in practice Lean appears to be a more participative, bottom-up approach than Six Sigma. One reason for this might be that Lean is characterised as relying more on intuition and deep insight (for example when producing future state value stream maps.”* Proudlove et al. (2008) point out that:

- Six Sigma is a generic, root-cause and solution unknown problem-solving approach. Precisely what components of the process to change and what to change them to should emerge from the rigorous, analytical, data-driven methodology with potential over-emphasis on being data-driven, rather than problem-driven.
- Lean, in contrast, brings principles for improving flow and some tried-and-tested solutions. These may be used at an early stage to construct a vision of the future configuration of the value stream, which may be used to guide and co-ordinate improvements.

They (Proudlove et al., 2008) highlight that *“whatever improvement approach is employed, it should be regarded as a key organisational change and simplistic approaches avoided.”*

When discussing the difference between Six Sigma and TQM Revere and Black (2003) conclude that *“TQM programmes are often compliance driven rather than quality improvement driven (whereas) Six Sigma returns focus to process improvement through root cause analysis.”*

Schroeder et al. (2007) cite 18 studies of TQM definitions and their relationship to performance and compare them to Six Sigma. They find from this analysis that Six Sigma is more prescriptive in nature than TQM. In conclusion they say that, *“overall much of what is being done with Six Sigma is not new with respect to prior quality tools but the deployment approach and emergent structure of Six Sigma (means that) Chief Executives (are) hailing it for its disciplined approach and financial return”* (Schroeder et al., 2007).

Dean (2000) thinks about the essentials of TQM and areas of commonality and difference with BPR. He suggests that both recognise the importance of processes and both start with the needs of the customer and work backwards from there. However, the two programmes also differ fundamentally (Dean, 2000):

- Quality improvement seeks steady incremental improvement to process performance.
- Re-engineering seeks breakthroughs, not by enhancing existing processes but by discarding them and replacing them with entirely new ones.
- Re-engineering involves a different approach to change management from that needed by quality programmes.

Dean (2000) concludes by stating that *“knowing the differences and similarities can assist organisations in selecting the right technique to solve problems.”*

8.2.2 Combining Techniques

Arhneiter and Maleyeff (2005) suggest that Lean and Six Sigma can be integrated together in order to complement implementations. They (Arhneiter and Maleyeff, 2005) say that *“Lean organisations should make more use of data in decision making and use methodologies that promote a more scientific approach to quality. In turn, Six Sigma organisations can gain from training in Lean management methods to eliminate all forms of waste.”*

Dedhia (2005) supports the use of Lean Six Sigma in order to achieve positive financial impacts. *“Lean can reduce waste and improve process efficiency and Six Sigma can reduce variation and improve performance. Savings can be doubled when Lean and Six Sigma are used in a coordinated manner. Both can be used in non manufacturing environments but both require management’s active support”* (Dedhia, 2005).

Andresson et al. (2006) suggest using TQM, Six Sigma and Lean together as a combination to process improvement. They suggest that a combined approach allows the issues or criticisms of each to be addressed, which they outline as *“TQM having large amounts of resources on implementing but with no tangible improvements achieved. Six Sigma programmes failing to create conditions in order to involve everyone and, Lean having a lack of flexibility”* (Andresson et al., 2006). They (Andresson et al., 2006) state that by using all three the impacts/measurables achieved would include through:

- TQM – improved operating results, better customer satisfaction, increased market share and profitability.
- Six Sigma – increased profitability.
- Lean – in three areas: operational (reduction of lead time, increase in productivity, reduction in inventory), administrative (reduction in processing errors, streamlining customer service) and strategic (reduced costs).

9

Discussion



This discussion section summarises and reflects on the findings within the literature presented extensively in sections 2–8 focusing on the relevance and application within the public sector. Within this section all the authors and publications are not listed again when mentioning a particular point – only a few will be used as either examples or to support a point. It also draws on the findings from the expert panel (summarised in Appendix 4). This discussion allows a number of questions to be answered as well as gaps in the literature identified, which have been provided in the Executive Summary.

9.1 Defining Business Process Improvement Methodologies

Sections 2 and 3 present the definitions and the methodologies of business process improvement methodologies considered within this review. The table in Appendix 1 presents the balance across the various publications included in the reference list (Appendix 2). This clearly illustrates that the majority of papers focused on Lean and healthcare. This probably reflects the current state of play of business process improvement methodologies across the public sector. Interestingly, Proudlove et al. (2008) conclude in their paper that *“the emphasis on people in Lean could make it a more acceptable approach than Six Sigma in the NHS.”*

Referring to the expert panel responses 64% mentioned Lean as a process improvement methodology being used in the public sector. This was then followed by 41% suggesting Six Sigma and 23% BPR. This confirms that the main methodologies focused upon in this review i.e. Lean, Six Sigma and BPR were the right ones and so create confidence in the findings and results presented. It should be noted that Theory of Constraints (ToC) was mentioned by three of the respondents. Young (2005) considered this approach along with the use of modelling methods aligned with process improvement methodologies. This publication noted that ToC *“has been applied to healthcare for sometime”* with particular examples in some specialities (Young, 2003). Further investigation of the use of ToC is something which could be considered but the lack of its inclusion in this review is not significant.

Considering the other business process improvement methodologies including TQM, benchmarking, Kaizen and ISO9000, none of these were mentioned by the experts and indeed their inclusion in the later parts of the review are minimal. However, many of these techniques are argued to be the foundation or a part of the Lean, Six Sigma or BPR approaches so understanding what they are and how they operate is an important aspect of the process improvement landscape.

Some of the methodologies suggested by the experts could be argued to be tools and techniques. Section 3 outlines the implementation methodologies, tool and techniques for Lean, BPR, Six Sigma and Process Improvement. The important aspect highlighted in this section is that all the implementations use a variety of appropriate tools that enable organisations to understand the customer requirement, understand the process and redesign better processes that better meet customer requirements.

Also reflected in section 3 are the ideas around the Toyota Production System and Systems Thinking. Systems Thinking, which some authors, including Seddon, argue is and should be the basis of Lean and business process improvement in general. Additionally, if managers do not understand system thinking then the implementation of process improvement methodologies will always be limited. Systems Thinking was defined by one of the responses from the experts as *“Seeing the system as a whole, managing on data, what is demand from the customer, what is value/failure and waste (from the customer’s perspective), process mapping, use of control charts as a measure of flow.”*

Seddon and Brand (2008) argue that in the public service the focus should not be on the process but on the system because only then can demand and waste be truly recognised. Seddon (2005) also recognises the difference of applying Systems Thinking concepts in manufacturing and service suggesting that *“in service the people and system are inseparable and it is people not machines who determine the system which needs to be done through knowledge NOT standards.”*

This difference of the application of Lean, Six Sigma, BPR and TQM was noted in a number of publications, both in terms of public versus private and manufacturing versus service. For example, with regard to implementing BPR in public sector, Thong et al. (2000) suggest there is the need to take into account the following differences to the private sector:

- Environmental factors: There is less market exposure thereby less incentive for productivity and effectiveness.
- Organisation-Environment Transactions: There are more mandatory actions due to unique sanctions and coercive powers of governments.
- Internal Structure and Processes: These are more complex (multiple, conflicting, intangible). Managers have less decision making autonomy, possibly less reluctance to delegate, more frequent turnover due to elections and political appointments.

It is important that the differentiation between the application of business process improvement methodologies in the public and private sector is made and, has been stated in both the Scottish Executive report (Radnor et al., 2006) and the HMRC evaluation (Radnor and Bucci, 2007) as well as other publications (e.g. Radnor and Walley, 2007; Radnor and Walley, 2008). Public services should adapt and not adopt Lean (and related methodologies). The evaluations found that only simple tools and techniques were being used, which focus around the main principles of Lean. A number of articles (e.g. Proudlove et al., 2008) highlighted that applying the simple tools and techniques was probably enough for public services with others (e.g. Antony et al., 2007) even suggesting that the use of statistical language within Six Sigma was unfamiliar and therefore a barrier to implementation.

In the responses to the question about defining process improvement methodologies for public services a few of the experts noted the need for adaptation e.g. *“public sector organisations need to understand fully how the approaches need to be modified and developed for their own use.”*; *“I feel that methodologies require considered adaptation within the public sector.”* Whilst others felt they should be the same as in manufacturing organisations. The point regarding a simplified approach was also mentioned *“Piece meal – limited – based on interventions from environments where demand is controlled and the flow of work is well understood.”*

9.2 Organisational Readiness, Success Factors and Barriers

Section 4 drew out the factors for organisational readiness or ‘enablers’ as some authors (e.g. Hines et al., 2008) called them, as well as the drivers for the process improvement. The section noted that although the drive for business improvement should come from an understanding of customer requirements, it often came from the need to reduce costs and improve quality. In addition to these elements, the drive for service improvement in the public sector was reported to be further influenced by government agendas, political policy and the need to improve public sector efficiency.

Organisational readiness can be summarised as improvement focusing on an organisation's awareness or realisation of the need for improvement, planning the change and developing an organisational culture which understands the customer requirement, has an organisational processes view and uses data to drive improvement.

For public services in particular organisational readiness was reported to be about strategy, engagement of staff, having a process view, understanding the customer and variation. In some cases, it appears that public sector organisations have focused less on these than on using the tools and techniques to implement change. As reported in the HMRC evaluation (Radnor and Bucci, 2007) this could lead to lack of sustainability in the longer term.

One area which several authors (e.g. Seddon and Brand, 2008; Silvester et al., 2004; Walley and Silvester, 2006) have highlighted as important for managers in public services implementing process improvement is understanding the nature of variation and demand. Seddon and Brand (2008) outline two different types of demand – value demand (*“what we are here to provide”*) and failure demand (*“failure to do something or do something right for the customer”*). They report that in local authorities the level of failure demand can be 80%. Understanding the type of demand and variation means the system and capacity can be designed to meet the demand thus reducing backlog and queues. This emphasis on managing variation was stressed by the work of Deming (section 3.5) which many authors stated is a foundation for process improvement methodologies.

Understanding demand and variation in public services and service as a whole is not as easy as in manufacturing but authors such as Spear (2005) assure us that it is possible if the changes and improvements are made in manageable chunks. Organisational readiness reminds managers in public services that they have to be careful not to just make poor processes more efficient by focusing on the tools but by taking the process/system view, customer view, data and linking the improvements with strategy.

Section 5 presents the success factors for the implementation of business process methodologies. These include leadership, communication, measurement systems, training and development as well as providing adequate resources, rewards and recognition and using experts/external support. Many of these success factors have been noted and discussed in section 5. Considering the replies from the experts similar points were also listed when asked about success factors (in descending order):

- Senior management commitment and engagement in improvement.
- Leadership at the top and at every level.
- Linking improvement to organisational direction.
- Time to allow impact to occur.
- Good customer understanding and response.
- Good understanding of the whole process.
- Training and development.
- Proper measurement of current performance.
- Engagement of all of staff.

Reflecting on this, it can be noted that some elements listed are presented within this report as elements of organisational readiness and others, as success factors. In a number of publications success factors also included elements for organisational readiness. For example when Hensley and Dobie (2005) discuss the need to adopt Six Sigma as a managerial philosophy they outline a number of critical success factors including *“managerial commitment and involvement, the organisation’s willingness to make cultural changes, patience from management and employees, the development of change agents within the organisation, the incorporation of Six Sigma efforts into the company’s strategic plans and the plans of its customers and suppliers, a well developed understanding of the tools in Six Sigma, and the ability and skills necessary to handle projects.”* This list includes both elements of organisational readiness and success factors. This illustrates that the definition between what is an element for organisational readiness and what is a success factor is blurred within the literature. This may not be such an issue in manufacturing and service organisations where there is probably a better understanding of customer requirements, processes and demand but, in public services, where these perspectives are still emerging it is probably important to distinguish between readiness and success factors – with one set allowing organisations to embrace the ideas of process improvement and the others allowing the implementation of the methodology to be successful.

The importance of senior management commitment to the implementation of business process improvement methodologies was evident both in the publications and in the expert panel responses. This was also supported by the findings from the Scottish Executive evaluation and HMRC – both clearly indicating the importance of senior leadership support (Radnor et al., 2006; Radnor and Bucci, 2007). Change management and strategy literature often mentions the need for senior management commitment but the findings from this review support how important this really is.

Related to this is the concept of ‘leadership’. Whilst leadership is important at the top of the organisation some articles mentioned how leadership needs to be developed throughout the organisation i.e. leaders or ‘champions’ of the process improvement methodologies. For Six Sigma implementation the ‘Belt’ infrastructure clearly helps to identify who the champions and leaders are. In Lean a similar structure could be introduced focused around the facilitation of the RIEs. What is important is that there is support and commitment to these champions and leaders in that their role is not an add-on to their day-to-day job. This commitment will reflect the level of resource and/or investment senior management are willing to give to the improvement programme.

Interestingly, only one expert mentioned effective communication as a success factor. In the literature and from the Scottish Executive and HMRC evaluations the importance of a clear communication strategy was emphasised. Particularly within HMRC where the initial communication regarding Lean was mainly through the Unions the need for effective communication was critical in order to allow long term sustainability of the initiative (Radnor and Bucci, 2008).

Allowing enough time and a lack of time for changes and improvements to embed was indicated as both a success factor and barrier by the experts. The concept of Lean (and probably Six Sigma) as a journey is one which is mentioned by a few of the publications (e.g. Kinnie et al., 1995). It has been noted that full implementation of Lean can take between 5-7 years in manufacturing companies where there is already an understanding of process and demand as well as customer (e.g. Bicheno, 2004; Hines et al., 2008). The changing political landscape and associated policies within the public sector can be a distraction from wider process improvement implementation.

Many of the barriers presented were the opposite of the success factors e.g. lack of commitment from senior management, objectives that are not aligned to customer requirements, a lack of training for staff and poor selection of projects. Additional public sector barriers included resistance from staff with a strong powerbase, the inability to define quality, political pressures and changes in policy and the perception that improvement techniques have been developed in manufacturing and are therefore not appropriate in a service environment.

The barriers noted by the experts also focus around management in terms of lack of commitment, changes in structure, lack of understanding of business processes and non compliant middle managers. The unwillingness to use external/private sector support was mentioned by four experts. This relates to the issue of seeing Lean and Six Sigma as manufacturing initiatives. However, the need for external support was noted as a success factor and emphasised by Womack and Jones (1996b). Therefore, some development of the right messages or external support may be an area of development for public services.

With Six Sigma implementation in particular barriers involved the need to have appropriate project management for the selection of the projects, the participants and support. The project structure requires both investment of time and money. The lack of resources was something noted both in the literature and by the experts. This links to the danger of a short term view of process improvement focusing around particular departments and functional processes. In HMRC the Lean implementation took an approach where *"there was nowhere to hide"* driving the changes and improvements from top down and bottom up (Radnor and Bucci, 2007). However, this involved a high level of investment of which the level of return is still something to be quantified.

9.3 Impact, Measures and Sustainability

Section 7 presents a selection of examples illustrating the impact of the implementation of Lean, Six Sigma and BPR. These examples report the impacts within public services both in the UK and overseas. Section 7.2.3 clearly indicates that there has been many implementations within healthcare. Many of the examples illustrate dramatic impacts of implementing a process improvement technique. Some would suggest that this is not surprising as many of process improvements are *"low hanging fruit"* as public services have only just begun to develop thinking in terms of processes (Radnor and Walley, 2007).

These examples, plus others listed in the publications but not outlined in this review, summarise the impacts usually in terms of quality, cost, time and satisfaction levels. Again this is supported by the views of the experts. When analysed, 41% mentioned the use of measures such as *"productivity rates, quality improvements, lead time"*, and 41% indicated success *"should be measured through investigating the added value across customer and staff satisfaction."* Cost savings were also mentioned in a few replies. A few of the experts mentioned the importance of having a series of measures which should be linked to the organisational strategy and/or improvement targets.

The need for a structured performance measurement or monitoring system is something considered to be a success factor yet in the literature very little is written about what and how these systems should be developed, implemented and used. Due to the relevance and importance of measures, measurement and auditing within NAO, effort was made to ensure that any relevant publications within this area were accessed. However, as the recent benchmarking exercise and report from Tanner et al. (2008) confirm, the area of performance measurement related to process improvement implementation and impact is far from developed both in the public and private sector.

Although auditing is a part of the Lean approach within the 5S framework (see section 3.1), very little has been written regarding a holistic auditing framework for a whole process improvement programme. Other than the NAO itself, tools that have been developed include one which is part of the 'Unipart Way' and, another developed by Hammer (2007), one of the founders of Business Process Re-engineering. Therefore, an appropriate means to evaluate Value for Money is one which needs to be addressed particularly if the level of investment occurs, as is indicated is needed, for business process improvement methodologies to be effective and sustained.

Regarding sustainability very few publications actually outline clear frameworks for achieving sustainability. In fact some authors (e.g. Bateman and Rich, 2003) refer to sustainability when presenting success factors or organisational readiness. This again illustrates the blurred picture regarding factors appropriate for readiness, success factors and those for sustainability. Although it is important not to be too prescriptive about this for some public services where little process improvement has taken place, particularly on a wide or organisational level, there is a need to identify which factors are important for each part of the programme/methodology.

The responses from the experts illustrates this point well – when asked how the methodologies can be sustained the replies (see Appendix 4) include development and engagement of people, management engagement and drive, expert external support and clear communication. Many of these have been mentioned as success factors. The literature review noted factors for sustainment should include management commitment, time and external support.

Effort was made in the HMRC evaluation to draw out elements which would lead to sustainability – these included some which built on the approach and tools which had been implemented (management training and commitment, use of the tools and techniques), other points introduced some new concepts (linking Lean implementation to HR policies, developing a better understanding of demand and customer requirements) (Radnor and Bucci, 2007). However, as Seddon (2005) and others have mentioned, what is required is a change of view of what processes and service delivery are within public services.

One point mentioned in the literature regarding sustainability was the development and introduction of standardised processes. This, in reality, is difficult in services, particularly public services, as the distance between the 'production process' and delivery is close. Within manufacturing it is possible to develop standard processes through the use of 'modularised' products which can be configured in a number of ways to produce a 'customised' product – thereby managing demand and variation. This means that the product has absorbed the variety required. However, in a service environment it is difficult for the product to manage the variety so it has to be the process which absorbs this level of variety. This, in effect, means the front line staff. Therefore rather than set rigid standard processes, it may be more appropriate to develop robust stable processes (Radnor and Bucci, 2007a). These processes and supporting improvement mechanisms can then be designed, managed and improved so the customer can 'pull value' (Seddon and Brand, 2008).

Related to sustainability is the combination of short term impact versus long term gain. Spear (2005) noted how lots of small change projects can have a dramatic impact. However, it has also been noted that it is important that these projects are all focused around a clear improvement strategy; otherwise the overall impact will not be achieved. There is a danger that public sector organisations run a series of RIEs and see this as 'Lean' or 'process improvement' whereas in reality it is Kaizen. RIE is an important tool of Lean. However, improvement simply through a series of RIEs raises issues around sustainability and the development of a wider improvement culture. As suggested in Radnor and Walley (2008) *"a fuller implementation, taking a more longitudinal, developmental approach allows the establishment of a sustainable Lean capability. This is achievable through a programme that can include multiple RIEs, though it requires alignment with organisational strategy as well as other tools and techniques including Kanban and, structured problem solving."*

The danger of focusing on just tools and techniques, particularly RIEs, could lead to Lean in the public sector being built on a foundation of sand where some of the basic conditions i.e. process view, understanding capacity and demand and, linking improvement activity to strategy are not in place. The impact and apparent success of RIEs means that organisations can, and are, getting caught up in 'now' and not in the 'then'. This means that RIEs are seen as 'Lean' and so little effort is placed into sustainable activities such as developing a culture of ongoing structured problem solving (Radnor and Walley, 2008). Hines et al. (2008) talk about the need to 'lead and live a Lean lifestyle'. This was also the aim within HMRC where great emphasis was placed on senior managers to 'Lead Lean' (Radnor and Bucci, 2007a).

It takes time to become and develop into an organisation which takes a value process driven approach. As Spear (2005) concludes *"in health care no organisation has fully institutionalised to Toyota's level the ability to design work as experiments, improve work through experiments, share the resulting knowledge through collaborative experimentation, and develop people as experimentalists."* However the publication notes that it is possible!

Taking or developing a combined approach may be a possible way for public services to develop business process improvement with Six Sigma giving a structured, data driven and statistical approach, Lean providing the philosophy focusing on value and waste, BPR supporting cross functional process and TQM ensuring that the people issues are addressed. However, to date within the UK public sector, as evidenced from the high number of publications, it is the use of Lean which appears to have caught the attention of both politicians and public sector managers particularly within healthcare.

10

Appendices



Appendix 1: Methodology

This Appendix provides a summary of the methodology used to identify relevant publications for the literature review. A more thorough analysis of how the publications were identified is outlined in the Literature Scoping Report, which was provided to the NAO in January 2008.

The publications used for this literature review have been obtained from the following sources:

- Online databases from the University of Warwick library, which include a large number of mainly business management academic peer-reviewed journals, magazines, trade publications, newspapers academic dissertations, case studies, editorials and reports. The databases used were ABI Inform/Proquest, Business Source Premier and Emerald Publishing. Advanced search engines were used using keywords and keyword groupings in order to obtain a manageable number of publications. Publications were then assessed for relevance by reading the publication abstract and some of the publication in detail. Assessment for inclusion was based on the relevance of the article content to public services, the quality of the journal, the age of the article and knowledge of the author/s in the field. This resulted in the identification of 91 publications being considered for the literature review.
- The research team's previous experience of reading similar publications for a literature review for the Scottish Executive in 2005. This literature review was concerned with Lean business practices and resulted in 74 publications being read and DES produced for each. The database searches mentioned above also highlighted some of the publications used for the Scottish Executive work. Therefore 31 DES from the Scottish Executive literature review were read and have been included in this review.
- Recent work by the research team looking at the implementation of Lean in HM Revenues and Customs, highlighted issues such as success factors, barriers and methodology for implementing business improvement techniques. Some of these findings, taken from the final report, have also informed this literature review.
- A review of recent publications obtained from other academics, from conferences attended and organisations worked with, resulted in a further 28 publications being identified. This included the Scottish Executive report written in 2005 and also papers from the special issue of the Public Money and Management Journal entitled 'Lean in the Public Sector', as edited by one of the researchers, Dr Zoe Radnor, which was published in February 2008.
- An expert panel of 28 individuals was set up including academics, consultants and practitioners from central and local Government organisations. A questionnaire was sent to all the individuals on the expert panel and 64% responded with information. This method resulted in the identification of further publications, which had not previously been highlighted. It should be noted that many of the respondents quoted the Scottish Executive report as a relevant reference source on the subject.

In total, therefore 152 relevant sources were highlighted as relevant publications from which to produce the literature review. These publications were distributed among the team of researchers. Each researcher was responsible for reading the publication and providing a summary on the DES. These DES were collated by the researchers preparing the literature review, and organised according to the following sections:

- Definitions and Key Principles.
- Methods and Framework.
- Organisational Readiness.
- Success Factors for Implementation.

- Barriers to Implementation.
- Impact: Outputs, Outcomes and Measures.
- Sustainability.

Appropriate information from each DES was then taken and used to complete the relevant sections. However, during the review some of the original sources were discounted as being irrelevant and additional sources were identified. Therefore, in total 162 sources have been used for in this review and are listed in Appendices 2 and 3.

117 sources have been directly referenced this report. A summary of their type, discipline and methodology focus is given in the table below.

Type of Publication	Number	%
Case Study	43	36
Conceptual Article	32	27
Description of Technique	18	15
Survey	10	9
News Article	6	5
Literature Review	4	3
Book/Booklet	3	3
Type of Publication	Number	%
Health Service	41	35
Manufacturing	28	24
Services	19	16
Local Government	10	9
Central Government	8	7
Emergency Services	2	2
Education	2	2
Legal	1	1
Type of Publication	Number	%
Lean	60	51
Six Sigma	31	26
BPR	15	13
TQM	11	9
Lean/Six Sigma	6	5
Systems Thinking	6	5
Capacity and Demand	3	3
Kaizen/5S	3	3
EFQM	2	2
Benchmarking	2	2
ISO9000	1	1
Kanban	1	1
Distribution	1	1
Statistical Process Control	1	1
Supply Chain Management	1	1
Theory of Constraints	1	1

Some publications recorded hits under more than one topic. Hence the total is greater than the number of publications that were used.

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Appendix 4: Expert Panel Questions and Analysis

In December 2007 questionnaires were emailed to 28 experts, chose from a mix of academics and practitioners in the field of business process improvement. A reminder was then sent in the middle of January. In total 18 responses were received (64%) of which 5 were academics, 10 practitioners and 3 which span the boundaries of both academia and practice. This represents a good response rate and spread of perspectives.

The responses have been summarised below. The number in brackets after the comment, represent the number of respondents who mentioned that point. Question 2 is presented with direct quotes due to the diversity of responses. It should be noted that a 7th question was asked regarding key readings in the field. The responses to this question have been included in the data sources in Appendices 2 and 3.

Question	Responses
<p>1 What would you describe as process improvement and efficiency methodologies for the public sector?</p>	<p>Lean Thinking (10) Six Sigma (7) Business Process Redesign (4) Theory of constraints (3) PDSA cycles (2) Systems Thinking (2) Business Excellence (1) Gap Analysis (1) Root cause analysis (1) Gathering Information (1) Pareto Analysis (1) Brainstorming or 'thought shower' (1) Team Building (1) Learning Styles (1) Thematic Analysis (1) Creative thinking (1) Visual and environmental cues (1) Capacity and Demand Analysis (1) Measuring the measurables (1) Problem Solving (1) Management and leadership capability (1) Process Mapping (1)</p>
<p>2 How would you define these methodologies for the public sector?</p>	<p>"Reliant on understanding of the customer wants and needs related to tight problem definitions." "Lean is a consumer focused approach to the provision of effective solutions involving the consumption of minimum of resources." "When trying to apply these techniques public sector orgs need to understand fully how the approaches need to be modified and developed for their use. There are many examples in which the public sector org has just thrown the techniques at people without sufficient understanding of the need for appropriate adaptation."</p>

Question	Responses
<p>2 How would you define these methodologies for the public sector?</p>	<p>“Where there is a culture of service improvement, it is OK to ‘use the names’ but under other circumstances the concepts can be used without the jargon.”</p> <p>“We use the Lean temple and different tools are more or less relevant in the public sector e.g. VSM more relevant than normal, QCO less relevant.”</p> <p>“Productivity improvements were fundamental to our approach and were the key focus. Other benefits such as Quality improvements were expected and required but of less importance. Again I think it is only with hindsight that whilst we are now doing the right thing the pendulum has swung from staff savings to customer benefits.” (NC)</p> <p>“Tools which can help managers and clinicians do their everyday jobs. I feel that the methodologies require considered adaptation within the public sector. I think that they are currently angled towards improving speed of delivery and that the opportunities to improve quality are often overlooked as the next target looms over the horizon. In order to ‘sell’ these methodologies to the public sector, I think they should be packaged in a way which is accessible to managers and clinicians alike as tools which can be used to make their working life better and will facilitate improvements in care for the patients.”</p> <p>“BPM – having clear process instructions and relevant performance measures.</p> <p>Lean – defining process requirements, elimination of waste and any NVA activities.</p> <p>Six Sigma – use of SS methodology to identify root causes and reduce process variation.”</p> <p>“Systems Thinking: Seeing the system as a whole, managing on data, what is demand from the customer, what is value/failure and waste (from the customer’s perspective), process mapping, use of control charts as a measure of flow. (As devised by John Seddon and his consultancy Vanguard).”</p> <p>“In the same way as I would in the manufacturing sector. This is a good test of a manager’s knowledge of his or her invisible processes. If they can’t identify or make the intuitive leap between their business processes and the process descriptions in manufacturing then this often identifies the problem in the public sector: too many managers who come in through a training programme which does not give them an opportunity to serve in and therefore understand the invisible processes they are managing.”</p> <p>“The definition: to change from a command-and-control design to a systems design.”</p>

Question	Responses
<p>2 How would you define these methodologies for the public sector?</p>	<p>“Piece meal – limited – based on interventions from environments where demand is controlled and the flow of work is well understood. These latter conditions don’t apply in many of the public sector streams where customer intimacy is also important and demand is erratic when viewed from the traditional ‘management silo’ approach.”</p> <p>“Discontinuous change includes methodologies such as BPR. I would include Lean in this group as Lean improvement often causes disruption. In the Continuous improvement category I would include Six Sigma, Kaizen Blitz, error-cause removal, and EFQM self-assessment. TQM programmes fall into this category.”</p>
<p>3 What are the success factors for implementing these methodologies?</p>	<p>Senior management commitment and engagement in improvement (5)</p> <p>Leadership at the top and at every level (4)</p> <p>Good understanding of the whole (cross functional) process (4)</p> <p>Time to allow impact to occur (4)</p> <p>Linking improvement to organisational direction. (4)</p> <p>Dedicated staff resources to help facilitate improvements (1)</p> <p>Good customer understanding and response (4)</p> <p>Training and development of staff (3)</p> <p>Engagement of all staff (3)</p> <p>Proper measurement of current performance (3)</p> <p>Getting results, quickly so that people can see benefits (2)</p> <p>Having an improvement culture (2)</p> <p>Learning from previous experience (2)</p> <p>Proper definition of the improvement projects (2)</p> <p>Team ownership of the plans and actions (2)</p> <p>Empowering frontline staff (1)</p> <p>Looking at the whole value stream (1)</p> <p>Coaching of the people as they develop their experience of using the approaches (1)</p> <p>Establishment of appropriate improvement targets (1)</p> <p>Good preparation prior to improvement (1)</p> <p>Respect for all staff (1)</p> <p>Expertise in the improvement techniques (1)</p> <p>Success also requires clear definition and realistic expectations set over a realistic timeframe (1)</p> <p>Expert support to kick off, internal capability built to run long term (1)</p> <p>Financial resources (1)</p> <p>Staff accountability (1)</p> <p>Effective communication throughout the organisation (1)</p>

Question	Responses
<p>4 What are the barriers to implementing these methodologies?</p>	<p>Unwilling and inability to have external/private sector support (4) Lack of resources (3) Lack of time for improvement and acceptance of learning cycle. (2) Non compliant middle and senior managers (2) Too large an initial scope for improvement (1) Mixed messages implicit or explicit (1) Using service improvement as a tool to deliver cost improvements (1) Union resistance in the public sector (1) Cultural resistance to being measured and managed on the basis of visible metrics (1) Public sector culture that there is no such thing as the customer (1) Lack of training (1) Other business priorities (1) Lack of senior level engagement (1) Changes in Board or senior management (1) No Senior Management understanding of their business processes (1) Internal bureaucracy (1) Use of tendering to get the cheapest support (1) No exemplars with which to benchmark progress (1)</p>
<p>5 How can their success be measured, if at all?</p>	<p>Short term measures of productivity rates, quality improvements, lead time etc (5) Quality measures like customer satisfaction and staff comments (5) Through a series of measures based on quality, safety, delivery, cost and people (4) Improvement in morale of staff as they are engaged better with what they are doing and enjoy work more (3) Cost savings or opportunity costs delivered (3) Against the problem definition initially and ultimately against the organisational policy/strategy (3) Measuring time taken and steps removed from process maps (1) Lean will improve efficiency and throughput time etc (1) Longer term measures such as staff retention rates/ reducing absences/staff satisfaction and customer satisfaction surveys (1) Improved value for money – doing more for the same amount or doing more value work (1) Time reduction (1)</p>

Question	Responses
<p>6 How can these methodologies be sustained in public services?</p>	<ul style="list-style-type: none"> Development of the people (4) Appropriate investment (2) Changing philosophy from internal perspective to customer (2) Stability at the top of the organisation (2) Standardisation of service (1) Engagement of the people (1) Understanding of the processes (1) Ownership of the improvements by the team (1) Ownership directly relate to performance management (1) Management engagement and drive (1) By clear agreed targets and measures (1) Expert external support (1) Where possible a common agreed methodology, training, measures and targets across all sectors (1) Full and clear communication of intent, progress and successes (1) Replication of best practices across other areas/ departments (1) Government inspectors become supporters of this process (1) Designing against demand creates a demand-sensitive system (1) Changing measures and roles leads to sustainable improvement (1) Linking to soft recognition and personal development plans (1)





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ISBN 978-1-906087-28-9

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The literature review was commissioned by The National Audit Office, UK