

Organisational Transformation; by Lean Sigma

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April 18, 2007

Executive Summary

Business transformation encompasses many areas of attention and change. It can provide the platform and vehicle to completely reform organisations through governance, culture, structure, process and people. To enable, deliver and sustain efficient transformation, specific industry-based tools and methodology are available. One of these is the popular combination of Six Sigma and Lean to form Lean Sigma. This union is an efficient one as they are not mutually exclusive and do compliment each other. The Six Sigma is a methodology focused on quantify and improving process defects through a data-driven statistical approach while Lean is about accelerating processes and cost reduction by waste removal; both with a theme of continuous improvement.

These methodologies were originally developed for the engineering and manufacturing industry but are becoming prevalent in industries such as the financial services and government. Comparisons of the two presented offer a new dynamic transformation model via identification and improvement.

Two cases in two different industries, the 3M Corporation and JP Morgan Chase and Co both use the Lean Sigma approach and have tweaked the methodology to suit their needs. Both have reported significant financial savings and efficiencies over and above expected in all areas of analysis.

In delivering transformation, project management is your instrument that composes transformation. Differences are quantified with a portfolio / program management technique such as Project Portfolio Management (PPM) stand out as parallel in the business operations and strategic transformation process.

Lean sigma as a mechanism for global business change and can drive a culture for continuous improvement. With a central message being on communications and engagement, businesses can transform away from a static current state can be made fluid; not only by meeting strategic objectives but also position the business and its stakeholders for long term success.

Introduction

In defining a model for organisational transformation, one must investigate the existing options available in change and program / project management. Typically all transformations are facilitated with the establishment of a program management framework to provide a basis for status reporting and setting and achieving milestones in line with organisational vision and desired outcomes.

While program governance provides the framework, numerous tools and technique exist in delivering tasks on time, on budget and at quality. Traditionally businesses have used either Six Sigma or Lean productions as their preferred method for continuous improvement. Various industry leaders have now identified the two as not mutually exclusive and that the effective application of key components of both systems operating together, can offer value and improved cost and waste reduction.

This report defines one integrated methodology in enabling the improvement and deliverance of products and services through Six Sigma and Lean production, called *Lean Sigma*. It shall also define two organisations in unlike industry sectors that have used the Lean Sigma approach in their business transformation activities.

Project management and transformation methodology shall also be compared and discussed with differences highlighted and represented in potential models for tact in delivery. This report offers a perspective in delivering and managing transformation through fundamental and enhanced project management methods.

Transformation Methodologies

Overview

Two widely used methodologies that can be used to compliment the other to aid transformation and improvement processes are Six Sigma and Lean manufacturing, commonly abbreviated simply as *Lean*. Used together they are called *Lean Six Sigma* or *Lean Sigma*. Both systems were originally developed for the manufacturing industry where they receive the most use, however due to its focus on processes, the same methods of analysis have been adapted to many transactional, product and service industries such as banking and finance, government departments and ICT organisations. Significant cost saving reported the order of US\$5 million over six months for nine CIOs at Textron and US\$500,000 on a single project at Raytheon Aircraft (Mayor 2004) have not been uncommon.

Six Sigma

Motorola developed this system in 1987 to quantify and improve defects in end to end processes via a disciplined, data-driven statistical approach for continuous improvement. The term 'Six Sigma' means to measure quality in striving for near perfection through six standard deviations between the mean and the nearest specified limit. The Greek alphabet symbol for sigma (σ) is also used to define 'standard deviation', being an indicator of the amount of variation or inconsistency between any group of items or processes (McKinsey 2004).

To achieve Six Sigma status, a process must not produce more than 3.4 defects per million with a defect defined as anything outside customer specifications. What this equates to is reduced waste and better service delivery for the organisation. For this reason larger organisations with high through-put will release benefits more quickly as they will reach one million sooner. A Six Sigma opportunity is then the total quantity of chances for a defect.

As a guide, process sigma can be calculated by using the on-line Six Sigma calculator at http://www.isixsigma.com/sixsigma/six_sigma_calculator.asp.

The core objective of the methodology is the implementation of a measurement-based strategy that focuses on improvement and variation detection through the application of Six Sigma improvement projects. These projects focus on three waterfall approaches being DMAIC (the common approach of the two) and DMADV and DFSS (Simon 2007).

DMAIC (Define, Measure, Analyse, Improve and Control (Fig1)) is an improvement system for existing processes that have fallen below specification and require incremental improvement.

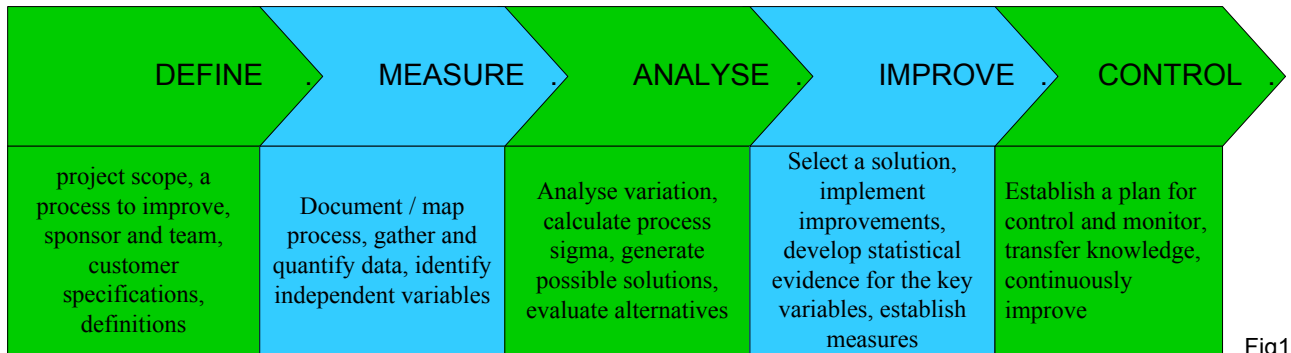


Fig1.

DMADV (Define Measure, Analyse, Design, Verify) is an improvement system for developing new processes or products at Six Sigma quality levels. It can also be used on existing processes that require improvement greater than incremental. This approach is only usually employed once the practitioner and organisation are familiar with DMAIC.

DFSS (Design For Six Sigma) is an approach used to redesign a product or develop a new one at Six Sigma quality. Unlike the DMAIC methodology, phases are not universally defined and rarely do companies define DFSS in the same way. DFSS is implemented either to suit their business, industry and culture, or to assisting in the deployment of a product or service. There also exists slight variations on DMAIC, DMADV and DFSS as taught by different training institutions and user organisations that provide similar result under a customised approach.

Both processes are used by accredited practitioners defined with the titles of;

- Green Belt – Have a supporting role to Black Belts, gather data and formulate reports
- Black Belt – Lead Six Sigma (DMAIC) projects, apply the methodology
- Master Black Belt – Can take an executive sponsor or Program Manager role, coaches Black Belts, responsible for benefits management

While on the surface, Six Sigma seems more aligned with Business Process Reengineering (BPR) than transformation, it has a large part to play in defining and managing organisational and cultural shifts where change is a holistic company-wide approach. To deliver the greatest benefit, senior leaders must select specific teams, define performance indicators to measure, establish accountability and install a vehicle to track progress (Larson 2003).

Six Sigma allows organisations to reduce cost in a scaleable and consistent manner. Like all methodologies, it requires senior management buy in and support to succeed.

Lean

Womack and Jones (1996) define Lean as, providing a way to specify value, line up value-creating actions in the best sequence, conduct these activities without interruption whenever someone requests them and perform them more and more effectively.

Lean was founded on a mathematical result known as Little's Law (George 2007) where:

$$\text{Lead time of any process} = \frac{\text{Quantity of things in process}}{\text{Average completion rate (unit of time)}}$$

Lean is a methodology that is used to accelerate the velocity and reduce the cost of any process or operating system (service or manufacturing) by removing waste. Lean aims to optimize costs, quality and customer service consistently as Toyota Motor pioneered in the 1950s, still remaining the only consistently profitable volume car manufacturer (Bhatia and Drew 2006). The Lean approach empowers staff to modify and refine complete end to end processes with the end user in mind, removing surplus activities that do not add value and deliver the product or service exactly as specified. The Lean process has three core areas of focus being waste, flexibility and variability as show in Fig2.

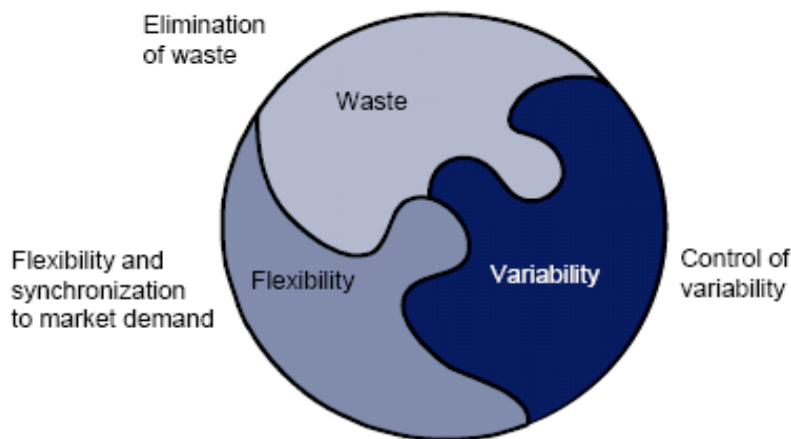


Fig2. The Lean manufacturing Model (Liker 1997)

The Lean operating system focuses on the end user (in most cases the customer) demand. To facilitate improvement and to reduce system inhibitors, various tools are available for application. These are such as:

- *Just In Time (JIT)* delivery – reduces inventory by making products complete at the time they are required and exact in number
- *Pull system* – the process step requiring the part or information, pulls it from the proceeding process reducing overlap, bottlenecks and lead times
- *Kanban* – The Japanese system for automatic production and reordering
- *Continuous improvement* of to reduce waste in areas of over production and processing, waiting, transportation, inventory, motion and rework
- *One Piece Flow* – Is the movement of products or information along a single path without stopping or overlap

In setting up a Lean infrastructure, four steps ensue (Jolley 2004);

1. Understand and stabilise the existing operating system
2. Introduce continuous flow processing allowing a one piece flow
3. Match the rate of production with the rate of customer demand
4. Introduce automation through a pull system

Like Six Sigma, Lean requires top-level executive support and diligence to implement and sustain to reap rewards. It should be understood that results are typically medium to long term and support through the entire term is essential. Lean as a process cannot exist on its own and will require significant cultural and behavioural change by stakeholders delivering transformation.

Alone, Lean production is most suited to the manufacturing world. However Lean and Six Sigma operating and complimenting each other together offer another dimension in enabling business transformation.

Lean Sigma

Traditionally Six Sigma and Lean production methodologies have been competing and clashing for top-rights. In recent times, the two operational improvement practices have been integrated into a system from providing a more rapid and complete solution, termed *Lean Sigma* by Drickhamer (2002). He goes on to say while Lean can eliminate the “noise” from a process, Six Sigma offers a sequential problem-solving procedure in the DMAIC process and the statistical tools to ensure processes that may require Lean are not overlooked. Mike Carnell (2001), president of Six Sigma Applications stated that Lean is really an enabler for Six Sigma.

Six Sigma is closely associated with defining defects, improving quality and reducing cost, while Lean is about improvements through speed and waste reduction. While Six Sigma addresses inconsistencies through formal projects, it does not enforce a program management outlook at all projects or contain specific tools to reduce waste (for example) like Lean does in its pull system. It does however define the call to action. Lean can fill this gap by advocating organisation-wide process improvement. Both principles with their common themes and differing methods of application suitability compliment each other. Some commonalities that exist are in cost reduction, performance objectives, work process focus, team approach and ongoing improvement. See Fig3 for a comparison.

| | Six Sigma | Lean |
|-------------------|--|---|
| Scope | Process | System |
| Focus | Variability reduction, then improvement | Value creation |
| Strengths | <ul style="list-style-type: none"> • Common language and problem solving approach • Scalable infrastructure • Fact-based rigor • Focus on financials | <ul style="list-style-type: none"> • System focus • Prescriptive solutions form an integrated operating system • Common language and problem solving approach • Simultaneously address operating system and performance culture |
| Weaknesses | <ul style="list-style-type: none"> • Project-centric • No prescriptive solutions • “Slave to DMAIC” • Elite focus | <ul style="list-style-type: none"> • Tool-based deployment • Difficult jargon • Hard to scale |
| Adoption | <ul style="list-style-type: none"> • GE • Motorola • JP Morgan | <ul style="list-style-type: none"> • Toyota • Alcoa • Airbus |

Fig3. Source: Jolley 2004

Organisational transformation embodies fundamental outlook shifts in

- Business Process Reengineering (BPR)
- Organisational learning approach
- Organisational hierarchy structure modification
- Performance management and measurement
- Organisational culture change
- Program management techniques

Lean Sigma addresses these areas in providing a single model for transformation at a process and efficient level.

Methodology Users

Case: 3M Corporation

3M is an international technology and invention company serving customers and communities with numerous brand products and services. The 3M brand is responsible for the products Nexcar, Post-it, Scotch, Scotch-Brite and Scotchgard. Industries where 3M products can be found are consumer and office, graphics, electro and communications, health care, industrial, safety, security and protection services and transportation that are sold in nearly 200 countries. 3M's worldwide sales last year totalled US\$21.167 billion and the company employs over 69,000 staff (www.3m.com).

In February 2001, 3M began their Lean Sigma when a new CEO came from GE. Today 3M over 55,000 employees have been trained in Lean Sigma processes and methodology and over 45,000 Lean Sigma project have been initiated or closed. This totalled more than seventy percent of all projects partly relying on Lean Sigma methods. 3M's Lean Sigma vision, "Achieving Breakthrough Performance for our Customers, Employees and Shareholders," is firmly rooted in the company's long history and culture of innovation (EPA 2007).

3M also use Lean Sigma in conjunction with their proven Pollution Prevention Pays (3P) system where operational efficiency, reductions in energy use, air emissions, waste reduction, greenhouse gas emissions and other environmental and waste impacts to reduce their triple bottom line.

Some quantified benefits from the adoption of Lean Sigma include;

- From 2001 to 2005, 3M's operating margins improved from 18% to 23% translating into \$1 billion in margin gain
- A reduction in volatile air emissions indexed to net sales of 61 percent (25 percent target)
- Reduce waste indexed to net sales to 30 percent (25 percent target)
- Increasing the number of 3P projects from the previous five-year period 1262 (400 target)

In 2005 3M also integrated Lean manufacturing into their continuous improvement program. For 3M, Lean has given them a broader view in the value system while Six Sigma has provided problem-solving tools for operations.

Case: JP Morgan Chase and Co.

JP Morgan Chase & Co. (JPM) and the Bank One Corporation merged in July of 2004 solidifying JPM's position as a leading global financial services firm with assets of \$1.4 trillion and operations in more than 50 countries. The firm is a leader in investment banking, financial services for consumers, small business and commercial banking, financial transaction processing, asset management, and private equity. With its corporate headquarters the firm serves millions of consumers in the United States and many of the world's most prominent corporate, institutional and government clients (www.jpmorganchase.com).

In early 2002 and prior to the JPM merger, Bank One leaders identified the need to improve in primarily driving return for the bank and launched a Lean Sigma initiative. After two years, the Bank One transformation was becoming evident as they were able to aspire to new goals

such as sustaining the fundamentals, service excellence, support revenue and creating a high performance culture (George 2003).

The corporation did not dive head first into implementation but delayed two common steps, one would seem core to transformation through Lean Sigma being no business-wide training on Lean Sigma concepts and the avoidance to creating project teams. The thinking behind this was to focus staff on fundamentals rather than a prescribed methodology without the pressure and responsibility that comes when hard decisions arise. While Lean Sigma ran as a “proof of concept” (Kaminski in George 2003) in the background, Bank One were building an infrastructure, supporting environment and a culture that would understand, embrace and leverage the new approach. This would become the cornerstone in sustaining an operational architecture for continual performance improvement in all business layers.

Implementations was facilitated by an external and expert group of practitioners called National Performance Consulting (NPC) who worked collaboratively with all levels of Bank One staff in coaching and supporting roles, as well as provide recommendations and expertise. NPC and Bank One started small Lean Sigma projects as part of their proof of concept and to begin to obtain buy in from stakeholders. These projects were prioritised using a process improvement approach and resourced. These projects began looking at end to end process improvements incorporating Lean and Six Sigma methods such as Kaizen and DMAIC.

Some initial results through the outcomes of these projects included (George 2003);

- Cycle time improvements ranged from a minimum of 30% to nearly 75%, measured in minutes (one administrative process went from 20 minutes to 12 minutes) and other times in days (a complaint resolution process dropped from 30 days to 8 days)
- Fiscal indicators are allowing Bank One to improve revenue
- Cost reductions or loss avoidance in the thousands of dollars

Some key challenges that Bank One faced were;

- Getting staff to allow sufficient amounts of their time to dedicate to Lean Sigma and process improvement successes
- Persuading managers and staff to take on higher risk and do what they seem is counterintuitive in realised larger gains in service areas
- Ensure users understand the Lean Sigma methodology in terms of the financial service industry (as these terms were traditionally manufacturing models)
- Build awareness in identifying and eliminating waste in day to day processes

Mike Fischbach, Senior Vice President of Implementation Services at Bank One recognises the need for a solid pro-change environment for Lean Sigma to be accepted and sustained. Implementation has been a success through the modification of the tool to fit the problem, not visa-versa. Bank One has adapted Lean Sigma to the finance industry and specifically their business by;

- Provide executive support created from a pull from frontline staff
- Replaced large training initiative with involving staff through deployment
- Running well-chosen pilot (proof of concept) projects using only essential tools, language and terminology

Bank One has cunningly modified the traditional Lean Sigma implementation to suit their business model that has transformed them into a supportive and sharper culture for continuous improvement. Lean Sigma offers simply a support mechanism to maintain it. Six Sigma methods are also used to leverage compliance with Sarbanes Oxley by reducing the minimum requirements mentality.

Their approach has proven positive and follows three simple guidelines being;

- 1 Apply Lean Sigma only to areas where there is a foundation from improvement
- 2 Start small then sell successes to the business
- 3 Place a trusted and influential sponsor in charge of the project

Note: Information gathered on 3M and JP Morgan Chase & Co was restricted to the public domain and generally positive. Hence assumptions around implementation and failures are not presented here.

Project Management and Transformation Methodology

Project management is a tool. It merely facilitates and composes transformation. The Project Management Institutes' (PMI) Project Management Body of Knowledge (PMBoK) document (2004) they define a project as; *"a temporary endeavour undertaken to create a unique product, service or result"*.

The Office of Government Commerce who have developed the Prince2 (PProjects IN Controlled Environments) project methodology define a project in two ways; *"as a management environment that is created for the purpose of delivering one or more business products according to a specified Business Case"* and also *"a temporary organisation that is needed to produce a unique and predefined outcome or result at a respecified time using predetermined resources"*.

All these methodologies essentially provide tools and techniques in managing successful projects or 'temporary' ventures located in the lower half of the project organisation architecture shown in Fig4. The upper tiers of the pyramid have a more strategic perspective. A *program* approach takes a high-level management style of incorporating several projects and manages them together as a whole. To further maximize business benefit, the next level of authority or *portfolio* level, is the collection of programs and projects that are all tasked with delivering the business strategic objectives as set by senior management. For a more holistic view at project management within a portfolio or program of work Project Portfolio Management (PPM) can be utilised.

Project Portfolio management (PPM) (also known as Enterprise Project Management (EPM)) provides a big picture and can be the glue that holds project governance structures in place. PPM is defined by PMI as; *"a management process designed to help organisations acquire and view information about all or a group of projects, then sort and prioritise them according to certain criteria such as strategic importance, dependencies, resources, cost and organisational need"*

It encompasses cost, timeline, risk, issues, scope and other key measurable and quantifiable data. PPM is a flexible approach and concentrates on high-level organisational initiatives and can evolve with changing program circumstances. Senior management typically holds the authority for PPM across the business. Due to this wider outlook and high executive involvement, PPM is more closely aligned in delivering consistent transformation across the business.

The fundamental difference between project management and transformation is in the size and magnitude of the change. Projects provide the mechanism for change that ultimately make up the transformation. When project are managed under programs of work, which are then in turn managed under a top-level portfolio, an effective and dynamic transformation / change architecture can be chartered and managed.

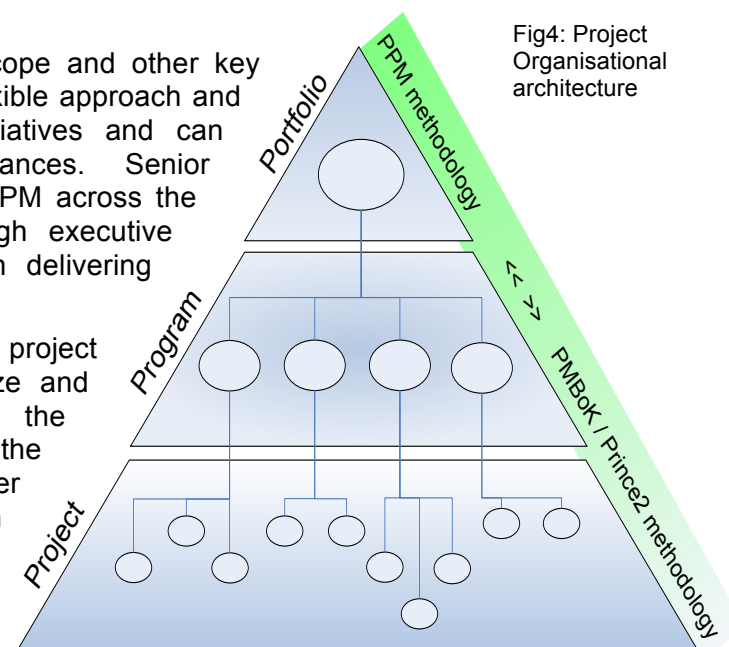


Fig4: Project Organisational architecture

A Project Management Model

The typical model for project management (Fig5) has a define start, middle and end. It looks only at the initiative it has been scoped to deliver with little consideration for that environment it resides.

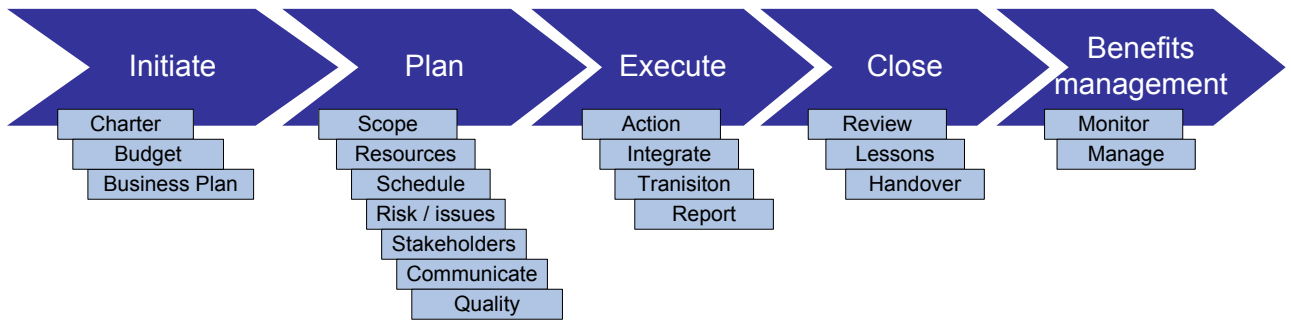


Fig5. Project Management model

A Transformation Idea

One idea for transformation (Fig6) shows a wide-reaching approach that incorporates principles of project management however also considers the nature of the surrounding environment, culture, people and business stance. It is truly about change with direction, the combination and fit of project outcomes and their sustainability. Transformation initiatives can be viewed as a large program of work making up numerous projects. Commonalities are evident in implementing project outcomes. The difference is that at a higher level, the portfolio/program lifecycle is underpinned by organisational impacts, with the business completely transforming itself through project outcomes to the revised new entity.

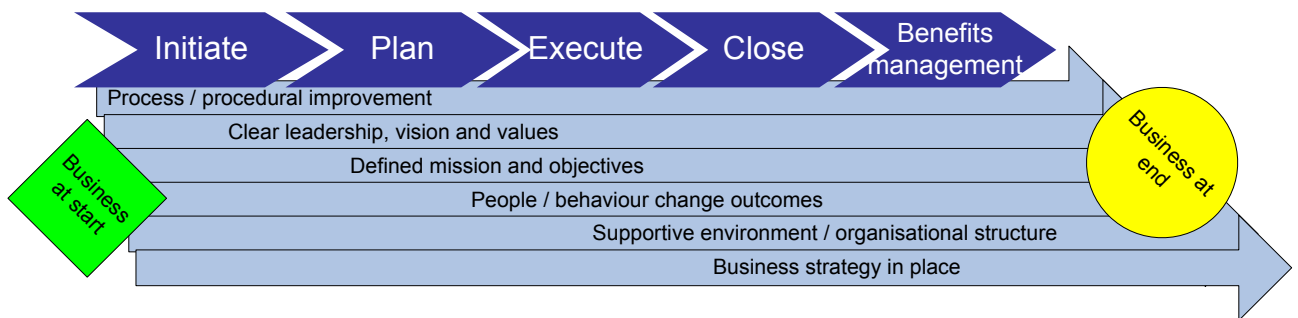


Fig6. An idea for Transformation

Summary

Lean Sigma methodology, portfolio management and change management share in a common directive – transformation. Used wisely in conjunction they can make a powerful and robust model for deliverance. In fact a generic model for transformation cannot be built for organisations to buy off the shelf. In building such a customised model, each process interrogates phases of evolution in developing or refining a product, service or outcome. However while management is similar in mechanics, approach is far more involving. This approach typically incorporates far greater communications and engagement with stakeholders and shareholders from the external environment as well. Transformation programs essentially affect more people and processes, both tangible and non-tangible outside the normal project of a project.

One critical success factor in ensuring sustainability after a transformation program has been closed is to manage peoples expectations at an organisational level with the overarching message here being consistent and regular communications and engagement. Securing buy in from staff will ultimately define success or failure.

Fundamentals in risk management will also assist in managing culture through the business transition. Typically people may start to feel frustrated and alienated from the cause and push against the change, levels of attrition can rise with staff uneasy about their potentially new or different role and some will continue to use the old system when the pressure is off.

The first step for organisation contemplating holistic transformation would be to look at their current stock and position. Define where they are in the market and where they want to go. This process may take months, incorporating research, data analysis and the financial impact of change. However a clear roadmap must be documented and supported by stakeholders before the first step is taken. The cost of transformation can be very expensive outside dollars and cents. It presents great challenge to organisations such as overcoming the resignation of staff and management, the increase in internal conflict, slip in market position, budget cuts in business-as-usual budgets in favour of program budget and the realisation that benefits may be measured in years.

However successful transformation can inspire innovation and creation of market-leading ideas and concepts and influence a continual learning environment for staff. Despite these challenges that can mar progress, it could be said that a static organisation not interested in change and transformation, is actually moving backwards.

References

- 3M Corporation 2007, website viewed April 2007 <<http://www.3m.com>>
- Bhatia N and Drew J, 2006, *The McKinsey Quarterly*, June 2006, McKinsey & Company, UK
- Carnell M et al 2001, *Leaning into Six Sigma*, Publishing Partners, USA
- Drickhamer D 2002, Best Practices – Where Lean meets Six Sigma. Website viewed April 2007 <<http://www.industryweek.com/CurrentArticles/asp/articles.asp?ArticleId=1247>>
- George M 2007, Ask the Expert: Integrating Lean and Six Sigma. Website viewed April 2007 <<http://www.isixsigma.com/library/content/ask-02.asp>>
- George M 2003, *Lean Six Sigma For Service: How to Use Lean Speed and Six Sigma Quality to Improve Services and Transactions*, McGraw-Hill, USA
- Jolley C LtCol 2004, *Performance Transformation*, McKinsey and Company 10 June 2004
- JP Morgan and Chase Company 2007, website viewed April 2007 <<http://www.jpmorganchase.com>>
- Larson Alan 2003, *Demystifying Six Sigma: A Company-Wide Approach to Continuous Improvement*
- Liker J 1997 *Becoming Lean: Inside Stories of Manufacturers*, Productivity Press, New York, USA. Pp.10-16
- Major T 2004, Six Sigma Comes to IT Targeting Perfection, CIO Magazine February 6, 2004. Website viewed April 2007 <<http://www.cio.com.au/index.php/id;1718145589>>
- McKinsey & Company 2002, *McKinsey & Company Operations Strategy & Effectiveness Practice*, pp.4
- Office of Government Commerce (OGC) 2002, *Prince2 Manual, Third Edition*, HMSO, UK
- Project Management Institute (PMI) 2004, *A Guide to the Project Management Body of Knowledge (PMBok)*, 3rd Edition, Project Management Institute, USA
- Simon K 2007, What is DFSS and how does DFSS compare with DMAIC. Website viewed April 2007 <<http://www.isixsigma.com/library/content/c020722a.asp>>
- Six Sigma 2005, *iSix Sigma Website* viewed April 2007 <http://www.isixsigma.com/sixsigma/six_sigma.asp>
- Womack J and Jones D 1996, *Lean Thinking, Banishing Waste and create Wealth in Your Corporation*, Simon & Schuster, New York, USA, pp.15

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Glenn McTaggart has been involved in delivering change via programs of work for over ten years. He provides professional services that explore new and proven approaches in linking organisational change and transformation with the value of effective program and project management concepts. For further information on the content of this paper and discussion on how Glenn can assist your project organisation please contact the author today.

Kind regards,
Glenn McTaggart
e glennmctaggart@gmail.com