LEAN SIX SIGMA AND THEORY OF CONSTRAINTS FOR SERVICE

MODEL DEFINITION AND VALIDATION AT ABSA

By

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DECLARATION

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ABSTRACT

Lean Six Sigma and Theory of Constraints for Service

Model Development and Validation at Absa

Lean, Six Sigma and the Theory of Constraints, as separate process improvement methodologies, were propounded and promulgated in the traditional field of manufacturing. The evolution of the trend towards the merging of methodologies gave rise to Lean Six Sigma, and later Lean Six Sigma and the Theory of Constraints as unified philosophies to enhance process improvement effort yields. Further to the emergence of these hybrid approaches advances have also been made in their application outside the conventional domain of manufacturing. The service industry, and specifically the banking sector, is one such area where the application of these philosophies has made remarkable advancements. Limited proof however exists on the applicability of Lean Six Sigma and the Theory of Constraints in the South African banking arena.

This work was aimed at developing and defining a Lean Six Sigma and Theory of Constraints framework specific to a South African banking context. This framework is based on the tools of Lean, Six Sigma and the Theory of Constraints while taking into cognisance the relevant performance metrics. The framework also had to take particular care to account for the social, economic and cultural influences that are particular to the geography. The framework defined in this work places emphasis on the importance of capability building and crowd sourcing over and above the

pure principles of the ideological foundation. Case studies on the application of the process improvement principles at the South African banking institution are included as a way of validating the hypothesis proposed for this non-traditional domain. The examples covered include process improvement efforts in the retail and investment banking space. One theoretical case study also examines how principles of operations research can be applied to process improvement and operational interventions to optimise workforce efficiency.

The framework and case studies herein highlighted are therefore used to make the argument for the application of Lean Six Sigma and Theory of Constraints outside the traditional manufacturing environment and further enhance the body of knowledge in this subject area. This work provides a refined roadmap for banks, and indeed other service industry institutions, in the South African market to implement and streamline the application of the hybrid process improvement methodology.

OPSOMMING

Lean Six Sigma en _Theory of Constraints_ vir diens

Modelontwikkeling en Geldigheidsbepaling by Absa

Lean, Six Sigma en die *Theory of Constraints* is op die tradisionele gebied van vervaardiging as afsonderlike prosesverbeteringsmetodieke voorgelê en bekend gemaak. Die evolusie van die tendens tot die samesmelting van metodieke het aanleiding gegee tot *Lean Six Sigma*, en later *Lean Six Sigma* en die *Theory of Constraints* as saambindende filosofieë om die uitslag van prosesverbeteringspogings te verbeter. Wat die opkoms van hierdie hibridiese benaderings betref, is daar ook vordering gemaak met die toepassing daarvan buite die konvensionele sfeer van vervaardiging. Die dienstebedryf, en spesifiek die bankdienstesektor, is een so 'n gebied waar die toepassing van hierdie filosofieë merkbare vordering getoon het. Daar is egter beperkte bewyse van die toepaslikheid van *Lean Six Sigma* en die *Theory of Constraints* vir die Suid-Afrikaanse bankdienstetoneel.

Hierdie werk is gemik op die ontwikkeling en bepaling van 'n *Lean, Six Sigma* en *Theory of Constraints*-raamwerk wat kenmerkend van die Suid-Afrikaanse bankdienstekonteks is. Hierdie raamwerk is op die middele van *Lean, Six Sigma* en die *Theory of Constraints* gebaseer, terwyl dit die relevante prestasiemetriek in ag neem. Die raamwerk moes ook veral sorg dat dit die maatskaplike, ekonomiese en kulturele invloede wat kenmerkend van die geografie is, in rekening bring. Die raamwerk omskryf in hierdie werk plaas klem op die belangrikheid van die vermoë gebou en skare

verkryging bo en behalwe die suiwer beginsels van die ideologiese grondslag. Gevallestudies oor die toepassing van die prosesverbeteringsbeginsels by die Suid-Afrikaanse bankinstelling word ingesluit as ’n manier om die hipotese wat vir hierdie nie-tradisionele sfeer voorgestel is, se geldigheid te bepaal. Die voorbeelde wat bespreek word, sluit prosesverbeteringspogings op die gebied van die kleinhandel en beleggingsbankdienste in. Een teoretiese gevallestudie ondersoek ook hoe die beginsels van operasionelenavorsing op prosesverbetering en bedryfsingrypings toegepas kan word om die doeltreffendheid van die arbeidsmag te optimaliseer.

Die raamwerk en gevallestudies wat hierin uitgelig word, word dus gebruik as argument vir die toepassing van *Lean Six Sigma* en die *Theory of Constraints* buite die tradisionele vervaardigingsmilieu en vermeerder die poel van kennis op hierdie gebied verder. Hierdie werk verskaf ’n omskrewe rigtingaanduider vir banke, en inderdaad ander dienstebedryfsinstellings in die Suid-Afrikaanse mark, ten opsigte van die implementering en stroomlyning van die toepassing van die hibridiese prosesverbeteringsmetodiek.

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DEDICATIONS

To my Ouma

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NOMENCLATURE

Ac	-	Acknowledged
AIP	-	Approval in Principle
BAGL	-	Barclay Africa Group Limited
BB	-	Black Belt
CI	-	Continuous Improvement
DFX	-	Derivatives and Foreign Exchange
DILO	-	Day in the Life of
FTE	-	Full Time Equivalent
FX	-	Foreign Exchange
GBT	-	Global Business Transformation
IB	-	Investment Banking
LFC	-	Long Form Confirmation
LMS	-	Lean Management System
LSS	-	Lean Six Sigma
LSSGB	-	Lean Six Sigma Green Belt
LST	-	Lean Six Sigma and Theory of Constraints
MM	-	Money Market
MBB	-	Master Black Belt
Nac	-	Not Acknowledged

Nomenclature

NDF	-	Non-Dollar Foreign Exchange
OPE	-	Overall Performance Efficiency
PFD	-	Process Flow Diagram
PI	-	Process Improvement
PTS	-	Post Trade Services
RCA	-	Root Cause Analysis
RCPS	-	Root Cause Problem Solving
QNI	-	Quality Net Income
SA	-	South Africa
SCORE	-	Select, Clarify, Organize, Run and Evaluate.
SIPOC	-	Supplier-Input-Process-Output-Customer
SOP	-	Standard Operating Procedure
SSI	-	Standard Settlement Instructions
TAT	-	Turn Around Time
TBA	-	To Be Advised
TOC	-	Theory of Constraints
VOC	-	Voice of the Customer
VSA	-	Value Stream Assessment
VSM	-	Value Stream Map
WILO	-	Week in the Life of

CHAPTER 1

INTRODUCTION

The financial services industry plays a significant role in the South African economic environment. With the increase in economic regionalisation and globalisation the banking services sector is facing an ever increasing level of competitive pressure from domestic and international banks. South African banks therefore have to improve service quality and pay more attention to the voice of the customer. These businesses must tightly control cost and improve the quality and efficiency of operations in order to maintain profitability. This work considers the applicability of Lean Six Sigma and Theory of Constraints as a quality management strategy mix within the South African banking market.

As relatively new and promising quality management initiative exists in the hybrid implementation of Lean Six Sigma and Theory of Constraints (LST) as a quality management framework. Initial work has thus far revealed empirical evidence to support the fledgling school of thought that Theory of Constraints (TOC) better focuses the efforts of Lea Six Sigma (LSS) implementation in the retail banking industry. The application of TOC has

the ability to focus LSS process tools on the proper leverage point for achieving a system's set of goals.

Service industry has traditionally been tardy in accepting quality management disciplines that have their origins in the manufacturing field. Resistance is due to inherent challenges in substantively quantifying program performance within service industry. The sector has however recently made strides toward joining the quality management movement. There still exist considerable opportunities for research into the subject of LST applicability in the service industry.

1.1 PROBLEM DEFINITION

A recent study by Ernst & Young has established that, in South Africa, the credit crisis had a negative impact on customer confidence in the banking industry. The survey conducted indicated that almost half of the customers in South Africa are not satisfied with the service they get from their banks (Ernst & Young, 2012). Poor service quality and price are cited as the main factors for South African customers leaving their main bank. The study also showed that majority of customers in South Africa are satisfied with the level of personalized attention they receive from their bank but are not willing to pay extra for independent financial advice.

The banking industry locally and globally is said to be undergoing a period of great change. Vester states that the expectation for SA banks is a sustained period of low returns with a focus on cost reduction and meeting the on-going requirements for new and ever more rigorous regulatory change (Verster, 2011). He also proposes that as South African banks find

themselves in a more regulated global economy, which has a higher emphasis on risk consciousness and increased stakeholder interest, they need to prepare for these conditions and respond proactively to these market shifts (Verster, 2011).

Unlike in the past, the impact of the regulatory changes are now central to a bank's strategy as they inherently inform decisions about products and clients with which the banks may wish to operate (Ernst & Young, 2012; Verster, 2011). Following the rise of value driven banking system there has been much written around value based management. The need for a framework to facilitate value based decision making has perhaps never been greater (Verster, 2011). An appropriate value based management framework is regarded as having the capacity to unify the business need for continuous improvement and growth with the ability to manage risk and stress a bank's portfolio.

Customers are viewed as taking greater control of their banking relationships. They are switching banks, changing their behaviour and demanding improvements within the service system. In response, banks need to re-evaluate their assumptions and fundamentally change how they interact with their customers (Ernst & Young, 2012). They need to embrace change by giving their customers greater flexibility, choice and control, and by reconfiguring their business models around customer needs. Research by Ernst & Young (Ernst & Young, 2012) shows that customers are now more likely to use other banks as brand loyalty has declined significantly. The study also shows that customer advocacy is gaining potency thus meaning

every unsatisfied client can have a relatively large knock on effect on the banks customer base. This is especially more so in this technological age were customers use social media as a source of banking information.

Customers want lower costs and better service (Ernst & Young, 2012; Verster, 2011). Improving fees and charges is the top priority. Therefore if the players in the South African banking industry want to survive in the globalised arena, managers will be obliged to change their approach to organisational competitiveness. This business environment has become dynamic and is evolving constantly; institutions slow to react to their changing environments often find themselves out of business.

Lean, Six Sigma and TOC, as established continuous improvement initiatives, have a strong foothold in the manufacturing field. Deductions from empirical and evidence informed inference suggest that a consolidated LST initiative has the potential to reap considerable benefits within service industry (Davies, 2003; Pirasteh & Farah, 2006). The problem is that there is no specific implementation framework model defined for the deployment of LST in the South African banking services sector. The existing frameworks have not been empirically or conceptually tested within this specific market.

There is therefore a strong need to define and test an industry and region specific implementation framework for the South African retail banking sector.

1.2 OBJECTIVE

The objectives of this project are to define an implementation framework model for a hybrid LST quality management system for the banking sector in a South African setup. The model shall employ TOC to better focus LSS initiatives in the banking services environment in South Africa. The research will go on to review examples in the deployment of the LST framework model on a targeted process family within the case study environment.

1.3 RESEARCH APPROACH

The project is conducted using two research designs in series. A qualitative research design was deployed for the model synthesis phase; this involved a literature review and qualitative "meta-analysis" on relevant and comparable case studies in existing literature. A survey research design was then employed for the model validation.

1.3.1 Research questions

- What are the current banking service quality management initiatives in South Africa?
- Can a LST framework be tailored for the South African banking industry? (Is LST a viable option for the South African market environment?)
- Can service quality case studies test and validate the applicability of the framework?

1.3.2 Hypothesis

It is hypothesized that the development of a banking sector focused implementation framework model for LST will improve service sector understanding of the hybrid LST methodology. The development and validation of said model should stimulate LST deployment by improving the body of knowledge on the management strategy and provide specific guidelines thereon.

LST presents the next step in service quality management initiatives. A banking services institution can deploy the LST framework to provide distinct service quality advantages against lagging organisations.

1.3.3 Research Method

The research approach applied in this study is composed of the following:

- Literature Study;
- Survey of current service quality initiatives;
- Process improvement framework model definition;
- LST service quality case study review and model validation.

An idealised sequence for this study is illustrated in Figure 1. This methodology can only be followed in the situation where there are minimal constraints of financial resources, access to information and time. The actual research therefore closely follows but does not strictly conform to this proposed ideal methodology.

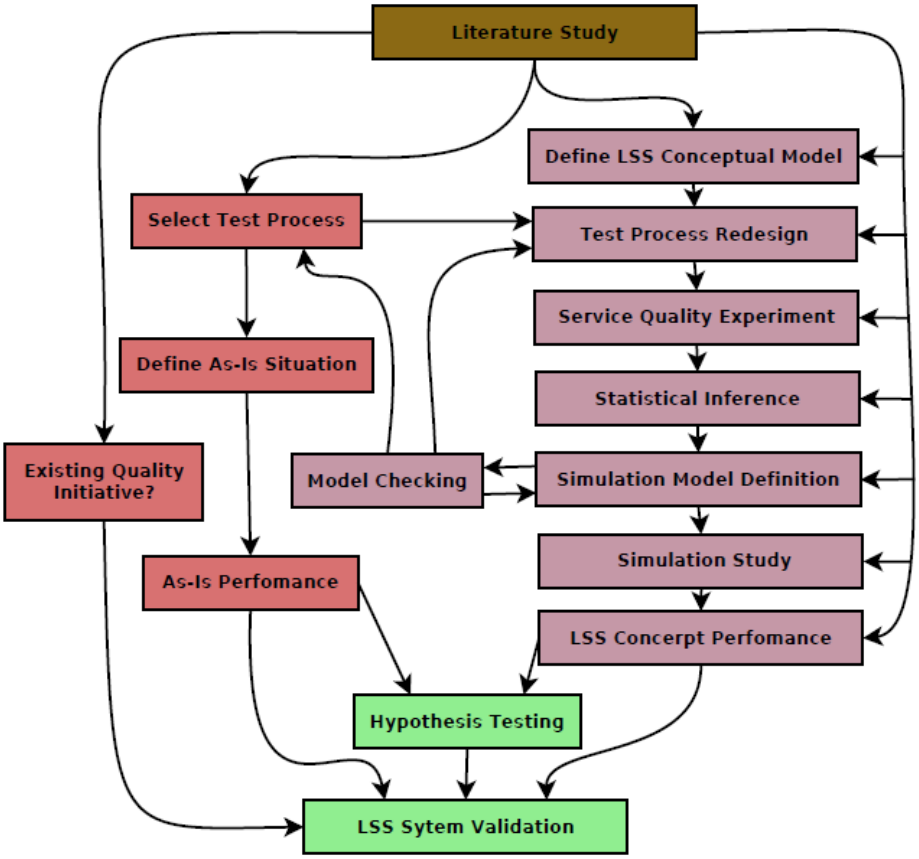


Figure 1: Idealised Research Methodology

The LST framework model is defined at the model synthesis stage. The model definition stage will involve a literature review on existing frameworks (in the context of the three individual strategies and combinations thereof) and the case studies on their implementation. Literature review was carried out with the focused aim of gathering data for comparing and contrasting the LST framework defined for a South African banking institute.

The second phase of this project process will encompass the validation of the defined LST model framework. Model validation is based on the review of process improvement case studies conducted on the methodology. The development and deployment of the process improvement (PI) methodology forms the premise behind the evaluation of the LST effort in a "PI mature"

environment. An idealised simulation experiment would interrogate the actual process systems through the manipulation of queuing models based on the as-is and to-be scenarios in the business. Figure 2 shows the modelling hierarchy applied in a conceptual simulation study.

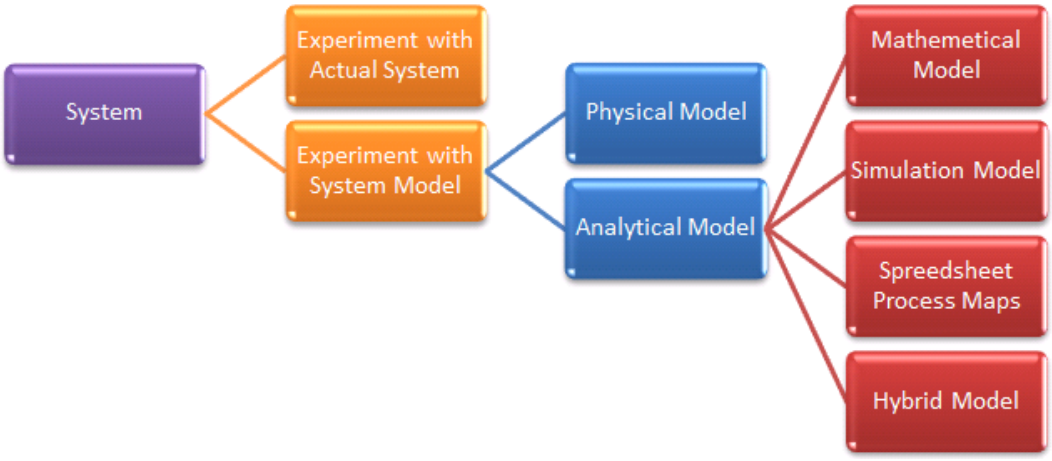


Figure 2: Modelling Hierarchy

Figure 3 shows the idealised service quality experiment design that could be deployed for the purposes of such an advanced study. The design of the detailed single experiment is proposed in Figure 4

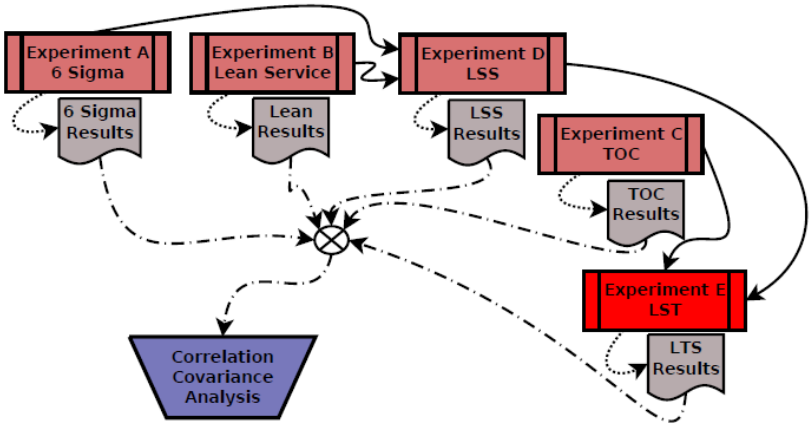


Figure 3: Service Quality Experiment Design

The literature study is used to research and explore different aspects of the problem after which LST framework for a South African banking institution

will be defined before reviewing case studies of deployment. The success of the PI model will form the basis of effectiveness validation.

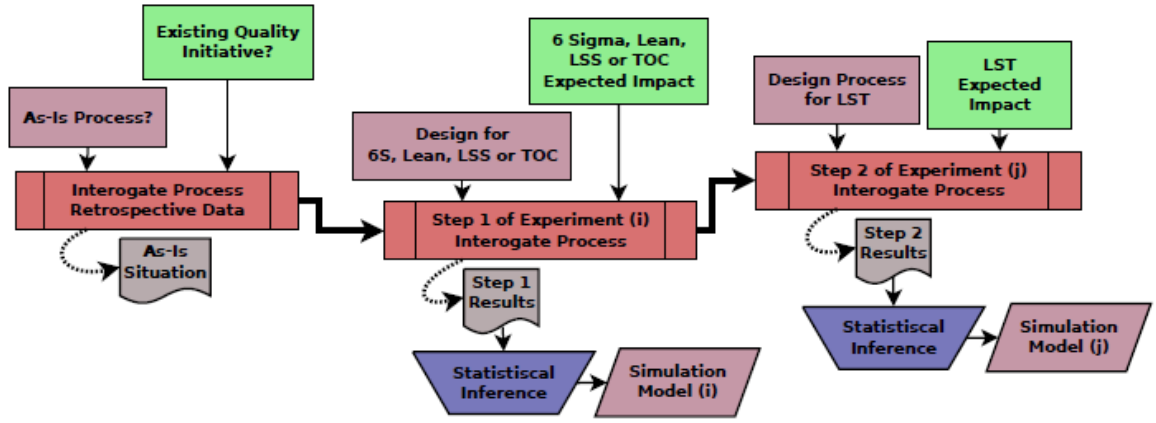


Figure 4: Detailed Single Experiment Design

1.3.4 Research Scope and Assumptions

Implementation of the above proposed study ideal in the effectiveness of the PI framework at an enterprise level would take a very long time and as such any full scale testing and implementation falls outside the scope of this study. This work therefore does not attempt to develop strategies for a full organisational roll out of the framework due to time and resource constraints. The PI framework strategy shall only be defined and tested in the case studies.

Due to limited research on South African implementation of LST frameworks, some aspects of this research are based on generalised information on international banking service quality and thus make an effort to lend this point of analysis to the South African market.

Figure 5 shows the organisational scope of the research.

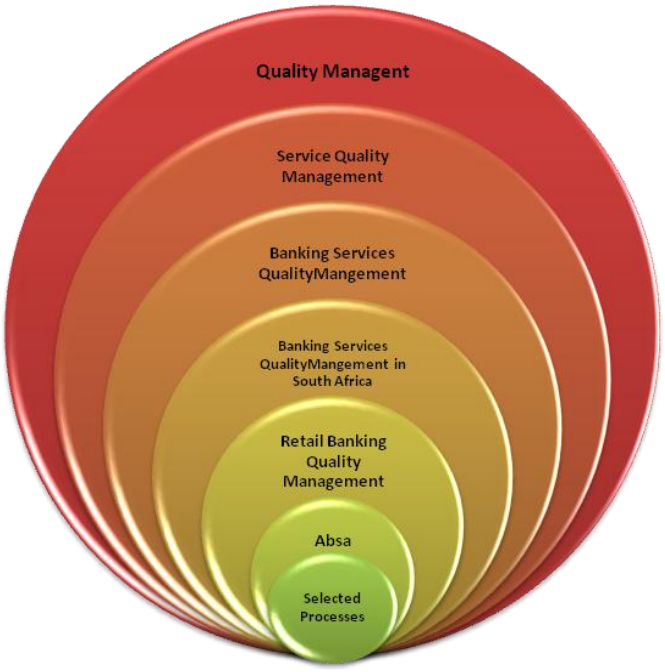


Figure 5: Organisational Scope of Research

CHAPTER **2**

SERVICE QUALITY

2.1 INTRODUCTION

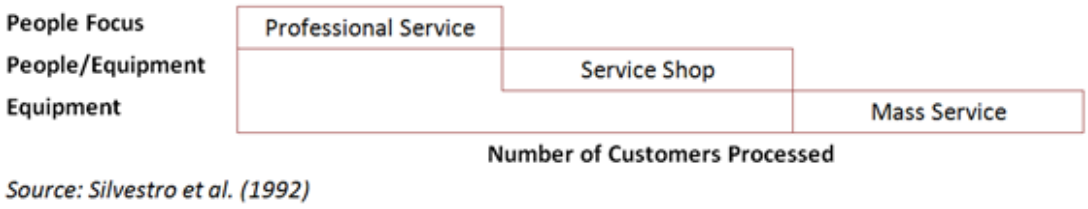
Quality has been defined as "a slippery concept" (Galloway, 1998) and this is even more true in the service sector. Most attempts at defining service quality have been driven by marketing and attempt to express the customer's viewpoint. While this approach is unquestionably important, it is often of little relative value to the operations manager charged with the task of delivering a quality service. Galloway outlined a model that allows a service provider to classify customer perceptions of quality so that quality improvement effort can be directed at those aspects of the service which offer most potential for improving customer satisfaction (Galloway, 1998).

2.2 SERVICE ORGANIZATIONS

Most activities undertaken in service processes are not specific to individual companies. By adopting the confined attitude of viewing themselves as unique, some organisations unknowingly forfeit the chance to exploit techniques that are generically compatible with all services (Siha, 1999). The classification of service operations and the application of methods

appropriate to the service classification have been suggested by some academics as a way of creating a path to better service management. Chase is known to have classified service by the extent of customer contact within the organisation (Chase, 1978). Customer contact denotes the time that a customer is physically present in the service system. At the high contact end is the "pure service" and at the low contact end is the "quasi-manufacturing" (Siha, 1999).

An empirical study conducted by Silvestro et al. (Silvestro, Fitzgerald, Johnston, & Voss, 1992) circa 1992 used information from their research to develop a service-process matrix shown in Figure 6. This form of service-process matrix has the volume of customers processed on the horizontal axis and the service classification on the vertical axis.

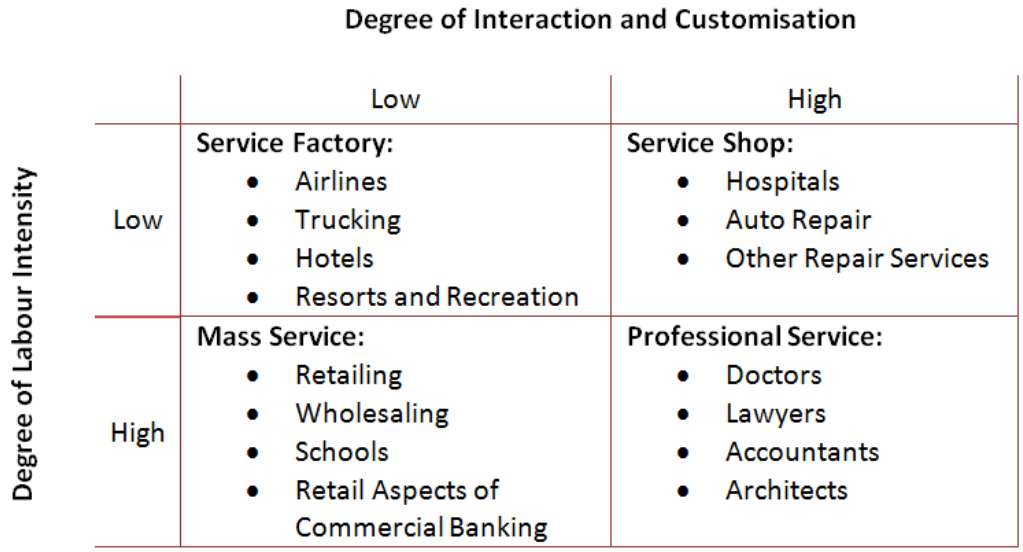


Source: Silvestro et al. (1992)

Figure 6: Service Process Matrix

A different tactic comprises the conversion of an effective ordering framework from manufacturing to service. Manufacturing employs a method for classification called the product-process matrix as outlined by Hayes and Wheelwright (Hayes & Wheelwright, 1984). Developed by Schmenner (Schmenner, 1986) as an equivalent to the product-process matrix in manufacturing, the service-process matrix is shown in Figure 7 . In this matrix, two crucial components are used to "pigeon-hole" service delivery processes, labour intensity, and customer interaction and service

customization. Siha showed that a two-by-two matrix can be produced from these two classification categories (Siha, 1999).



Source: Schmenner (1986)

Figure 7: Service Process Matrix

Siha argues that the classification schemes have the unfortunate property of being only descriptive and further states that the purpose of classification is the identification of managerial problems for a class of service processes that will lead to a class of solutions to the problems. This lends from the intuitive logic that properly identifying a problem is the first step toward solving it. There is however still a need to develop a way to control the system efficiently on a continuous basis. This is another reason for investigating the application of Lean, Six Sigma and TOC to the service sector.

2.3 Product and Service Quality

The concept of quality means different things to different people, while most people would agree that quality is an important characteristic of a product

or service, asking each one of them how a particular product or service rates in terms of quality one may get just as many unique responses. Despite its importance, quality can be understood only after a consensus on its definition. As a concept with as many potentially different interpretations, quality needs a precise definition if it is to be measured, controlled, managed, specified to suppliers and evaluated by customers. Quality is specified by the customer and may be broadly defined as "Conformance to customer specifications and expectations".

The complex and dynamic nature of today's products and services make it inextricably difficult for organisations to understand the expectations of all customers, let alone live up to them. Service quality expectations have increased the complexity of expectations that once were mainly limited to products. The management of quality for a service creates challenges that are quite different from those associated with the purchase of goods. This can be best understood by examination of the dimensions of product and service quality. Garvin and later Pisek summarised product quality through eight dimensions: performance, features, reliability, durability, serviceability, aesthetics, response, and reputation as shown in Table 1 (Garvin, 1984; Plsek, 1987). A contrasting set of dimensions for service quality consists of reliability, responsiveness, assurance, empathy, and tangibles as indicated in Table 2 (Fitzsimmons, Fitzsimmons, & Fitzsimmons, 1999).

Table 1: Dimensions of Product Quality

Dimensions of Product Quality	
Performance:	What are the desirable characteristics of the product?
Features:	What additional characteristics of the product are possible?
Reliability:	Is the business dependable? Does it accomplish what it promises?
Durability:	How long will the product last?
Serviceability	Can the product be easily and inexpensively services?
Aesthetics:	Does the product satisfy subjective requirements, like appearance and style?
Response:	Is the interaction between the customer and the product provider pleasant and appropriate?
Reputation	What does information on past performance say about the company?

Table 2: Dimensions of Service Quality

Dimensions of Service Quality	
Reliability:	Does the business keep its promises?
Responsiveness:	Does it promptly respond to the needs of its customers?
Assurance:	Can the employees generate customer trust and confidence?
Empathy:	Are employees approachable and sensitive to individual customers?
Tangibles	Do the physical facilities, equipment, and written material show care and attention?

Finch notes that the product quality dimensions that are associated with services seem to be lumped into the categories of reliability and response. He also states that likewise, the product-oriented dimensions of service quality are lumped into the category of "tangibles". Figure 8 (Finch, 2006) illustrates an integrated view of product and service quality dimensions. The importance of both service and product quality attributes is undeniable when one recognises the issues that make a supply chain more competitive than its competitors. Product quality is therefore of little importance if delivery requirements are not met.

Of the quality dimensions specific to products, the performance dimension results from specific characteristics and capabilities of the product or service. Performance for a product may include the actual function the product is able to perform, while for a service this refers to the ability to

respond accurately to customer needs. Features are additional capabilities that can be added to a product or service. These additional features go beyond the basic functional level, or stated differently, additional services that add to the basic service are considered features. The durability dimension describes how long a product will last under different conditions. Serviceability is a measure of effort required to repair a product.

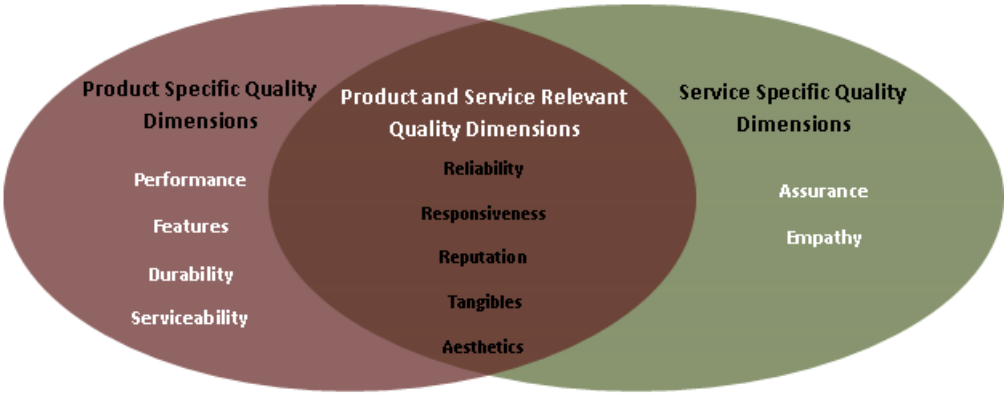


Figure 8: Dimensions of Service and Product Quality Combined

Service specific quality dimensions include assurance and empathy. Assurance relates to the level of trust and confidence generated by employees that customers interact with. Empathy is the approachability and sensitivity employees demonstrate.

Quality dimensions that are shared between products and services include reliability, responsiveness, reputation, tangibles, and aesthetics. The reliability dimension addresses the consistency of performance. Responsiveness addresses the company's ability to respond promptly. Reputation summarizes the business's performance history. Tangibles are the physical facilities, equipment, and written material the customer comes in contact with. The aesthetic dimension covers the look, sound, or smell of

a product, or the way it feels. Aesthetics go beyond the functional characteristics of a product and include subjective, ancillary characteristics

2.4 Quality and Value

The components of value (cost, quality and timelessness) are all necessary parts of the value equation. Without them, value cannot be created and sold. The components of value do not necessarily play equivalent roles, however. Value is a function of costs and benefits. The "benefits" side of the value equation consists of processes and capabilities and the resulting quality and timelessness. A product or service with "bad" quality does not meet customer's expectations.

$$Value = \frac{Quality}{Cost}$$

People usually have a tendency of mistaking "low price" with "low cost" and are seduced by a "good deal" only to be disappointed later. Lack of quality means that the product or service does not meet the customer expectations, but the presences of quality does not necessarily mean a good value. Outrageous cost or delay in availability may overshadow the quality component. Quality is therefore a necessary component of value, but it is not sufficient. Quality is so important to value that many customers try to learn about product quality before making a purchase.

2.5 Quality and Profitability

Quality has a double effect on profitability. The most direct is impact through its relationship with value. As quality goes up, all else being equal,

value also goes up. When quality rises above the wants and needs of the customer, the customer may not recognise it as valuable and may not be willing to pay for it, however. A price increase necessary to cover the cost of added quality features may reduce the value. The key is thus to focus on the customer by letting the customer define quality.

The increase in net income that results from enhanced value can come in several forms, including increased demand, increased customer loyalty, increased market share, and the resulting increased sales. Increased value also provides an opportunity to increase the selling price, also increasing net sales.

Quality has another, less obvious impact on net income through its link to product and service production costs. Many quality improvement initiatives create reductions in costs through a variety of means. Among these are reductions in scrap, warranty claims, labour, recalls, repairs, rework, and inventory.

The consequences of a defective service are very different from those of a defective product. Unlike product quality, service quality is difficult to measure before the customer receives it. The customer is thus involved in every case of defective service quality. Customer exposure to defective service can have a variety of outcomes, worst of which can be total disaster. Service quality experiences are best dealt with through a process of prevention rather than reaction after the fact as defects are significantly more difficult to rectify.

CHAPTER 3

LEAN SERVICES

3.1 INTRODUCTION TO LEAN

The pivotal ideology, practices, tools and techniques of "Lean" are well known and accepted internationally as an effective way to build and maintain business improvement practices over the long term. Steered by advancements established at the Toyota Motor Company over 50 years ago, Lean has demonstrated to be a reliably efficacious approach to enhancing organisational performance.

The core idea of the "Lean" concept is to maximize customer value while minimizing waste. Simply put, lean means creating more value for customers while utilizing fewer resources. A lean organization understands customer value and focuses its key processes to continuously increase it. The ultimate goal is to provide perfect value to the customer through a perfect value creation process that has zero waste. This minimisation of waste is realised through the targeting of the "Eight Wastes of Lean" in any process, product or service. The eight wastes are illustrated in Figure 9.

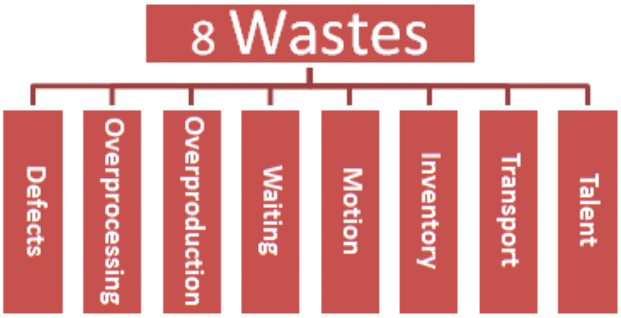


Figure 9: Eight Wastes of Lean

Literature shows that, as a new term, "Lean" was coined to describe Toyota's business during the late 1980s by a research team headed by Jim Womack, Ph.D., at MIT's International Motor Vehicle Program. However, as a concept, Lean was known and practiced for decades, albeit be it only by a few researchers and specialized manufacturers (Alina-Maria, 2011). Knowledge and practice of Lean has, from the late 1980s, spread across organizations, industries, researchers and continents (Sayer & Williams, 2012).

In basic terms Lean can be described as a holistic and sustainable business management strategy focused on creating and maintaining value for the customer while eliminating waste in the process. Corporate leaders often focus on the "tools and techniques" applicable to the context of their company. Ultimately it is management systems and the human spirit that give their purpose to the Lean effort thus empowering the business change effort (Alina-Maria, 2011). Lean, from a manufacturing viewpoint, is an initiative that shortens the lead time between a customer order and the shipment of the products or parts through the elimination of all forms of waste. Lean helps firms reduce costs, cycle times and unnecessary, non-

value added activities, resulting in a more competitive, agile and market responsive company.

Lean is therefore not only about continuous improvement, but also about respect for people (Alina-Maria, 2011). It is only by uniting purpose, process and people that an organization may obtain sustainable change and business excellence. Many banks and other financial institutions routinely apply the management principles of lean manufacturing to help standardize straightforward business procedures, thus creating value for their customers.

To accomplish this, lean thinking changes the focus of management from optimizing separate technologies, assets, and vertical departments to optimizing the flow of products and services through entire value streams that flow horizontally across technologies, assets, and departments to customers.

Eliminating waste along entire value streams, instead of at isolated points, creates processes that need less human effort, less space, less capital, and less time to make products and services at far less costs and with much fewer defects, compared with traditional business systems. Companies are able to respond to changing customer desires with high variety, high quality, low cost, and with very fast throughput times. Also, information management becomes much simpler and more accurate.

3.2 LEAN FOR PRODUCTION AND SERVICES

A popular misconception is that lean is suited only for manufacturing. Research has shown that Lean applies in every business and every process. In essence Lean is not a tactic or a cost reduction program, but a way of thinking and acting for an entire organization.

Businesses in all industries and services, including healthcare and governments, are using lean principles as the "way they think and do". Many organizations choose not to use the word lean, but to label what they do as their own system, such as the Toyota Production System or the Danaher Business System. This is done to drive home the point that lean is not a program or short term cost reduction program, but the way the company operates. The word transformation or lean transformation is often used to characterize a company moving from an old way of thinking to lean thinking. It requires a complete transformation on how a company conducts business. This takes a long-term perspective and perseverance.

The characteristics of a lean organization and supply chain are described in the book "*Lean Thinking*" written by Womack and Dan Jones, founders of the Lean Enterprise Institute and the Lean Enterprise Academy (UK) respectively (J. P. Womack & Jones, 2004b). While there are many very good books about lean techniques, Lean Thinking remains one of the best resources for understanding "what is lean" because it describes the thought process, the overarching key principles that must guide ones actions when applying lean techniques and tools.

3.3 PURPOSE, PROCESS, PEOPLE

Womack and Jones recommend that managers and executives embarked on lean transformations think about three fundamental business issues that should guide the transformation of the entire organization (J. P. Womack & Jones, 2004b):

- **Purpose**: What customer problems will the enterprise solve to achieve its own purpose of prospering?
- **Process**: How will the organization assess each major value stream to make sure each step is valuable, capable, available, adequate, flexible, and that all the steps are linked by flow, pull, and levelling?
- **People**: How can the organization ensure that every important process has someone responsible for continually evaluating that value stream in terms of business purpose and lean process? How can everyone touching the value stream be actively engaged in operating it correctly and continually improving it?

3.4 LEAN METHODOLOGIES

The five-step thought process for guiding the implementation of lean techniques is easy to remember, but not always easy to achieve (J. P. Womack & Jones, 2004b):

1. Specify value from the standpoint of the end customer by product family.
2. Identify all the steps in the value stream for each product family, eliminating whenever possible those steps that do not create value.

3. Make the value-creating steps occur in tight sequence so the product will flow smoothly toward the customer.
4. As flow is introduced, let customers pull value from the next upstream activity.
5. As value is specified, value streams are identified, wasted steps are removed, and flow and pull are introduced, begin the process again and continue it until a state of perfection is reached in which perfect value is created with no waste.

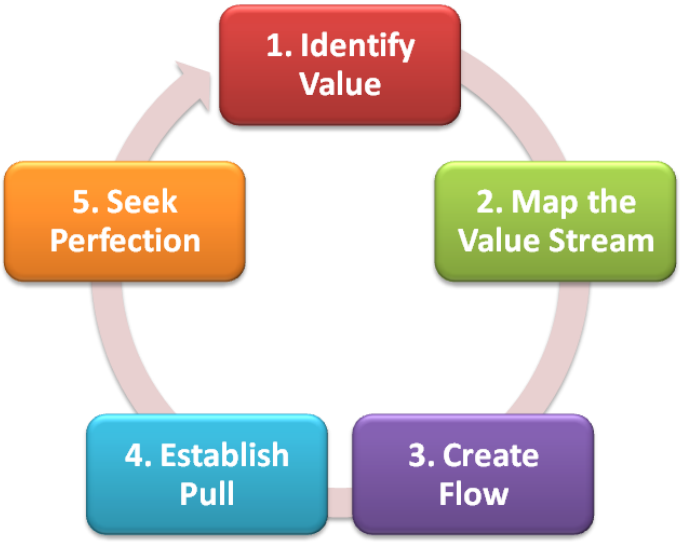


Figure 10: Five-Step Thought Process for Lean

3.5 Lean Management in Banking

The main aim of applying Lean Management in banking is the creation of business excellence as a means of gaining competitive advantage by reducing waste and increasing customer value. The banking industry is a service specific business characterized by the purely data and information nature of the service delivered. The most critical banking transactions are most often performed as an outsourced or internalised back-office service

function. From this standpoint the supplier and the customer are the same entity. Banks are typically office environments with a highly skilled workforce, applying computers and data process capabilities to perform their tasks. In a bank, respect for people is of utmost importance.

Lean Management is directly relevant to banking since it is a pure process business. Lean processes and procedures can streamline a bank by:

- Reducing cycle times of specific processes;
- Cutting costs of doing business by eliminating wasted time and effort;
- Growing customer value by better quality services;
- Reducing monotony of processes;
- Promoting workforce morale by engaging them in the development and implementation of improvements.

The objectives of implementing Lean Management practices in a bank are reducing costs and increasing revenue gains. It is typically possible to attain a 25% reduction in costs and 50% or more in turnaround times and in process errors and, in addition, realise revenue gains of around 5% annually.

Similar to most other competing services, the differentiating aim in banking is to improve turnaround time and quality at all service levels. The delivery of banking services at a sufficiently rapid and quality balanced rate is an essential factor for the bank to improve flexibility so as to better respond to changing customer demands and market conditions. Typically, faster services are delivered by fewer hands and by eliminating unnecessary steps in processes.

CHAPTER 4

SIX SIGMA FOR SERVICE

4.1 INTRODUCTION

The popularity of Six Sigma as a means of improving the quality of service and customer satisfaction is growing. The management methodology is now increasingly applied to a variety of processes ranging from manufacturing to service and fragmented transactional processes. Six Sigma was developed to be a meticulous quest in the reduction of process variation and defect rate in all critical business processes to achieve breakthrough improvements in process performance that generates significant savings to the bottom line of an organisation.

Six Sigma aims to deliver a regimented approach to improving service efficacy (i.e. meeting the sought-after characteristic of a service) and service efficiency (i.e. time and costs). Six Sigma is the incessant and thorough quest for the reduction of variation in core service processes to achieve continual and innovative enhancements in service performance that impact the bottom line results of an organisation. The focus is not on counting the defects in processes, but, rather on the number of opportunities that could

result in defects (Antony and Banuelas, 2001). Clearly there is a need to explicitly define the ways in which a service process could fail prior to determining the sigma quality level (SQL) of the given service. A defect in the context of Six Sigma is defined as "anything that does not meet the customer requirements" (Adams, Gupta, & Wilson, 2003).

The Six Sigma methodology plays a main function to pinpoint major problem areas and devise powerful strategies to tackle such problems which improve the customer experience. The focus must be on the following key issues (Antony, 2004a);

- Improved organisational cross-functional synergy;
- Fire-fighting to Fire-prevention mode Cultural Transformation;
- Improved worker morale;
- Faster delivery of service through reduction in number of non-value added steps in critical business processes;
- Reduced cost of non-conformance;
- Greater job satisfaction spurred by improved consciousness of problem solving tools and techniques;
- Enhanced consistency in level of service; and
- Effective management decisions made on reliable data and facts rather than on assumptions and emotion.

4.2 SIX SIGMA OVERVIEW

Six Sigma is a powerful business strategy that yields a dramatic reduction in defects, errors, or mistakes in service processes (Antony, 2004a; Antony,

2006). It is a powerful methodology developed to accelerate improvement in service quality by focusing relentlessly on reducing process variation and eliminating non-value added steps or tasks (Kwak & Anbari, 2006). Antony states that improved processes lead to improved customer satisfaction, increased productivity, increased market share, business profitability, and so on (Antony, Antony, Kumar, & Cho, 2007). Six Sigma provides business executives and leaders with the strategy, methodology, infrastructure, tools, and techniques to change the way businesses are run (Antony & Banuelas, 2002). In spite of a number of Six Sigma success stories in manufacturing organisations, many service organisations are yet to be convinced of the benefits from the introduction, development, implementation and deployment of Six Sigma within the service industry.

Although the Six Sigma approach to quality and process improvement has been used predominantly by manufacturing organisations, currently the popularity of Six Sigma in service organisations is growing exponentially, especially in banks, hospitals, financial services, the airline industry, and utility services, to just name a few (Antony, 2006). George states that even within manufacturing companies, it is very common to have only 20 per cent of product prices driven by direct manufacturing labour with the other 80 per cent coming from indirect costs associated with support and design functions, including finance, human resources, and marketing (George & George, 2003). The objective of a Six Sigma strategy in service processes is to understand how defects occur and then to devise process improvements

to reduce the occurrence of such defects which improve the overall customer experience and thereby enhance customer satisfaction.

Antony points out the fact that manufacturing organisations build Six Sigma efforts on an established base of measurable processes and established quality management programs. In service organisations, it is often a struggle to develop and apply measurements of quality (Antony, 2006). He further stresses that moreover, in many cases processes within the service industries are not very well understood and controlled due to excessive "noise". Here the term "noise" refers to an uncontrollable factor or event (for example, the emotions of the person who provides the service) during the delivery of a particular service. Additionally, in service industries, most decisions rely on the judgement of a human and the criteria are much less precise. In other words, in the services industries decisions made by people drive processes much more so than in manufacturing. Unlike manufacturing organisations, in service organisations we do not normally relate activities in process terms and therefore the linkage between process measurements and service performance characteristics is more difficult to establish.

Six Sigma is particularly attractive to many service processes today because of its customer-driven methodology (Taghaboni-Dutta & Moreland, 2004). In many service organisations, the purpose of introducing a Six Sigma program is to establish and map the key processes that are critical to customer satisfaction. According to Pande et al., most service organisations operate at sigma quality levels of between 1.5 and 3.0 (Pande, Neuman, & Cavanaugh,

2000). This is not surprising, considering that for decades service sectors have been neglected in the context of quality improvement efforts (Antony, 2006).

4.3 SIX SIGMA APPLICATIONS: MANUFACTURING VS. SERVICE SECTOR

The majority of material developed on quality management and improvement philosophies were originally designed to advance product quality in the manufacturing sector (Antony, 2004a). However, many quality experts had argued that the key principles of quality management could be implemented successfully in the service sector as well (Deming, 2000) (Feigenbaum, 1991) (Ishikawa, 1985). It is therefore necessary to briefly compare and contrast the manufacturing and service industry applications of Six Sigma.

The manufacturing sector quite commonly has to have some sort of process measurements mechanisms in place to aid in the monitoring of product quality. Quality measurement is often overlooked within the service industry and thus improvement of quality is not adequately tackled by many service-oriented businesses (Antony, 2004a). It is usually the norm to construct or refer to existing process maps to aid with the initiation of Six Sigma in manufacturing environments. Until recently, process flow maps were a tool seldom used in the service sector. Manufacturing makes use of explicitly defined measurement system analysis (repeatability and reproducibility study). Service industry measurement system analysis is often a more general problem of data quality and integrity. Service-type processes generate data sets that follow non-normality for non-conformance situations

that can be alleviated through the effective use of data-transformation techniques such as Box-Cox transformation for example (Antony, 2004a). Service processes tend to be subjected to more noise as compared to manufacturing processes. Human behavioural characteristics are generally regarded to have major influence on service quality delivered to customer.

4.4 SIX SIGMA IN SERVICE

Six Sigma is being implemented successfully in a broad range of services. Traditional manufacturing companies are taking their Six Sigma experiences and moving the applications of Six Sigma to their service operations (Antony, 2006). Six Sigma offers a disciplined approach for improving service effectiveness and service efficiency. Service-oriented businesses adopting a Six Sigma business strategy will have the following benefits (Antony, 2004b; Antony et al., 2007):

- Improved cross-functional teamwork throughout the entire organisation;
- Transformation of the organisational culture from fire-fighting mode to fire-prevention mode;
- Increased employee morale;
- Reduced number of non-value added steps in critical business processes through systematic elimination, leading to faster delivery of service;
- Reduced cost of poor quality (costs associated with late delivery, customer complaints, misdirected problem solving, etc.);

- Increased awareness of various problem solving tools and techniques, leading to greater job satisfaction for employees;
- Improved consistency level of service through systematic reduction of variability in processes; and
- Effective management decisions due to reliance on data and facts rather than assumptions and gut-feelings.

4.4.1 Why is Six Sigma required in the service industry?

Research carried out by Chatterjee and Yilmaz has shown that most service processes such as shipping, invoicing, billing, payroll, customer order entry, baggage handling processing, etc., are performing at less than a 3.5 sigma quality level, with a defect rate of over 23,000 ppm or 97.7 per cent yield (Chatterjee & Yilmaz, 2000). Improving the sigma quality level of the above-mentioned processes to a 4 sigma quality level, the defect rate will drop to 6,210 ppm. This clearly indicates a 3.7-fold improvement in process performance. The process yield will be increased to 99.38 per cent. This would bring significant financial returns to the bottom line of any organisation engaged in continuous improvement programs such as Six Sigma. Service processes create scrap and rework in the form of costs of poor quality just like manufacturing processes (Bisgaard & Freiesleben, 2004). In fact, most developed countries no longer have a manufacturing-based economy. The real economy in these countries involves such fields as financial services, health care, e-commerce, and logistics, but less manufacturing, which has tended to move offshore to low-cost locations. Six Sigma can be used in this case to reduce the costs of poor quality so that a

more consistent process for service delivery may be achieved. Another important reason for the introduction of the Six Sigma strategy in many service companies is that customers of today feel "process variability" in the delivery of the service provided and not just focus on "process average or mean". The objective of a Six Sigma strategy is to reduce "process variability" around the acceptable target service performance (Antony, 2006).

4.4.2 Myths about Six Sigma in Service

Although Six Sigma has garnered much deserved attention and recognition in the manufacturing sector, its applications in the South African service industry are not yet well documented. Experts agree that the most common reason service-oriented organisations stay away from Six Sigma is that they see it as a manufacturing solution (Antony, 2006). One of the major hurdles service-oriented organisations must overcome is the notion that, because their company is human-driven, there are no defects to measure. This is wrong, say the experts.

It is quite a common view among many people engaged in service organisations that Six Sigma requires complicated statistical tools and techniques. The truth is that Six Sigma is not about a collection of statistical tools and techniques. In fact, service organisations simply do not need many of the tools and techniques of the Six Sigma toolbox (Antony, 2006). The majority of the process- and quality-related problems in service organisations have been proven to be easily approachable using the simple problem-solving tools of Six Sigma, such as process mapping, cause and effect analysis, Pareto analysis, control charts and so on (Abdolshah, Yusuff,

Ismail, & Hong, 2009; Adams et al., 2003; Antony, 2004a; Antony, 2006; Antony et al., 2007).

Six Sigma demands massive training costs and additional effort has become another misconception among many employees in the service sector. It is true that Six Sigma requires some investment at the outset for training the most talented people in an organisation and converting them into the so called "change agents". However, it is already a proven fact that the benefits obtained from Six Sigma implementation outweigh the investment costs (Antony, 2006).

4.4.3 Benefits of Six Sigma in service organisations

Studies have shown how Six Sigma has been used widely in the service industry to target various problems to produce outcomes that have presented good benefits (Antony, 2004b). Service industries where the methodology has been applied include,

- Healthcare;
- Banking;
- Financial Services;
- Utility services;
- Defence and others.

The impact of Six Sigma includes reductions in defects, costs, processing times, and customer complaints (Antony, 2004a; Antony, 2004b). Improvements were also realised in the cash flow and reporting efficiency. Table 3 is an extract of case studies, obtained from different sources and as

cited by Antony (Antony, 2004a), which are specific to the benefits of Six Sigma to the banking and financial services industry.

Table 3: Benefits of Six Sigma in Service

Service	Problem	Outcome
Banking	Customer Complaints	Significant reduction in customer complaints and increase in customer satisfaction
	Excessive internal and external call backs plus unacceptable credit processing time	Reduced internal and external call backs, reduction in credit processing time
	High number of flaws in customer-facing processes (e.g. account opening, payment handling, etc.)	Reduced flaws in all customer-facing processes. Increased customer satisfaction. Improved process efficiency. Reduced cycle time
	Excessive market losses on trading errors, high costs associated with electronic order corrections etc.	Reduced trading errors significantly. Reduced costs associated with order corrections, etc. Improved employee morale
Financial Services	High administrative costs	Reduction in administrative costs
	Unacceptable wire transfer processing time to customers	Reduced wire transfer processing time by up to 40%
	Problems in accounts receivables within an accounting department	Improved cash flow

Adapted: Antony, J. 2004

4.5 CONCLUSION

As a business strategy and a systematic methodology, Six Sigma use leads to advances in profitability through dramatic improvements in service quality, product performance, productivity and customer satisfaction. The methodology has been considered as a strategic tactic for achieving superiority in operations and service performance. The application of the Six Sigma technique in the service industry, and particularly in the financial services sector, is rapidly emerging as the new wave of change in the area of Six Sigma for quality management.

CHAPTER 5

THEORY OF CONSTRAINTS

5.1 INTRODUCTION

It is evidently apparent that some management systems initially established specifically for manufacturing setups may not be suitable for service organizations (Siha, 1999). There are explicit dissimilarities between manufacturing and service organizations that render manufacturing management methods unsuitable for the service industry. Manufactured goods can be stored as inventory to provide products during periods of excess demand. Services cannot be pre-produced and held in inventory (Siha, 1999). Managing the equilibrium between capacity and demand is a different challenge for manufacturing than it is for service organizations. However, there are also similarities that make some techniques adaptable to either situation. JIT and TQM are examples of such systems (Duclos, Sih, & Lummus, 1995). Siha argued that since TOC is a management philosophy that has been effectively applied in a wide range of manufacturing environments it was high time it was transferred to service (Siha, 1999).

5.2 WHAT IS TOC?

The Theory of Constraints (TOC) is a relatively new managerial philosophy that has been steadily evolving since the early 1980s (Reid, 2007). The TOC is an intuitive systems-based framework, developed by Goldratt, for managing organizations. The philosophy seeks to understand the underlying cause-effect relationships that are responsible for an organization's performance (Goldratt, 1990). Goldratt documented his conceptual framework, ideas, and illustrated their applications through several books.

At the core of the TOC framework is the aim to continually improve the performance of organizations through a process of "on-going improvement". The TOC framework emphasizes the importance of defining and understanding the global goal of the organization as a condition for accomplishing success. The TOC concept is based on the notion that resources available for most processes are limited, and should therefore be directed towards a well-defined and focused goal (Klein & Harowitz, 1996). According to the TOC, the goal of a corporation should not be defined using terms such as technology, share of market, automation, quality or human resource development, but as the ability to realise a return on investment in the present and in the future (Klein & Harowitz, 1996).

TOC can thus be defined as an all-encompassing philosophy that acknowledges the constraint on any system which constricts the maximum performance level that the system can obtain in relation to its goal (Siha, 1999). Rahman asserts that TOC prescribes new performance measurements which are quite different from the traditional cost-accounting

system (Rahman, 1998b). As a systemic management philosophy, TOC is based on three interrelated premises (Schragenheim & Dettmer, 2000):

- every system has a goal and a set of necessary conditions that must be satisfied if its goal is to be achieved;
- the overall system's performance is more than just the sum of its component performances; and
- Very few factors or constraints, often only one, limit a system's performance at any given time.

Rahman also summarised the concept of the TOC as:

- *Every system must have at least one constraint.* A constraint "is anything that limits a system from achieving higher performance versus its goal" (Goldratt, 1988a).
- *The existence of constraints represents opportunities for improvement.* Contrary to conventional thinking, TOC views constraints as positive, not negative (Rahman, 1998b). Constraints govern the yield of a system therefore a steady promotion of the system's constraints will improve its performance (Schragenheim & Dettmer, 2000).

The goal for most manufacturing and service organizations is to make the maximum possible profit now and in the future. Constraints fundamentally limit the organization's capability of achieving the goal of making a higher level of profit. The TOC philosophy could be applied to every day operations decisions as well as to continuous improvement effort (Siha, 1999). The TOC consists of two main branches; logistics (every day operations) and continuous improvement.

Theory of Constraints

The owners of a company have the right to establish goals to be targeted. Stockholders of publicly held companies invest for maximum returns on their investments. In a private or non-profit organization the goal may, however, be other than aimed at maximizing profits. When applying the TOC, for example, Gardener and Blackstone defined the primary goal of a manufacturing organization as the maximization of long-run profit (Gardiner & Blackstone, 1991). The TOC requires that after clearly defining the goal, the organization establish specific measurements that will enable management to determine the impact of any action on the goal in order to maximize the efficiency of resources used in the organization.

In order to understand better the unique approach of the TOC, it is important to examine its relationship to other powerful techniques such as JIT and TQM (Klein & Harowitz, 1996). The JIT and TQM philosophies are emphasizing customers, management commitment, lead time, statistical process control (SPC), market share, eliminating waste, simplification and throughput, among other factors, as the key to achieving continuous improvement. The techniques suggest a variety of excellent techniques designed to support the improvement process (Hutchins, 1999)(Black, 1995). However, both philosophies are solidly rooted in the concept that any improvement, anywhere in the process, improves the performance of the whole organization.

The TOC, on the other hand, uses a different point of view which is described clearly by Umble and Spoede (Umble & Spoede, 1991), using the analogy of a steel chain. "*In order to strengthen the chain, one must*

strengthen the weakest link". If a link other than the weakest is strengthened, the strength of the whole chain is not increased. The concept of a chain can be used to represent processes in any organization. Using multiple dimensions, complete organizations can be modelled as process grids made of sets of interlaced chains. To achieve the organization's goal, every link – resource or functional area – must perform its task effectively.

According to the TOC, improvements in the organization should focus on the weakest link in the chain. Only actions that eventually improve the bottom line are considered improvements. The theory considers other actions an inferior use of precious resources, which otherwise may have been used to improve the weakest areas and progress towards the goal (Goldratt, 1990). Klein *et al* note that the strength of the TOC lays in the fact that, contrary to most other management techniques, it provides a method for focusing all local efforts on improving the appropriate links, and achieving quicker bottom line improvements (Klein & Harowitz, 1996). The result is a significantly faster rate of improvement in the performance of the complete chain.

5.3 LOGISTICS BRANCH

The logistics branch of TOC has three elements, V-A-T analysis, scheduling process and performance measures (Siha, 1999).

5.3.1 V-A-T analysis

V-A-T Analysis is a method to categorize plants based on the product and the process flow. The ``V'' plant has very few raw materials and many final products. The ``A'' plant has many raw materials and a limited number of

final products. The ``T'' plant has many final products that are assembled in many different ways from a limited numbers of components and subassemblies. This analysis is very important in recognizing the type of problems, issues and concerns associated with each type.

5.3.2 Scheduling process

The Drum-Buffer-Rope (DBR) is a unique TOC technique of scheduling processes with a constraint. In order to maintain a system at optimum performance business must configure the system so that capacity constraints within the scheme are always operating at peak capacity. The Drum is the capacity constraint. The capacity constraint sets the pace for the system as a drum sets the pace for marching soldiers. The Buffer isolates the capacity constraint from negative effects of the rest of the system. The Rope ties raw material release to the capacity constraint buffer to assure that inventory is at the lowest level that will maintain capacity constraint performance at maximum (Siha, 1999).

5.3.3 Performance Measures

There is always a need to employ performance measures which accurately indicate the system's performance in relation to its goal. Goldratt and Cox suggest three measures for manufacturing (Goldratt, Cox, & Whitford, 1992), namely:

1. **Throughput** (T): the rate at which the system generates money through sales.
2. **Inventory** (I): all the money invested in purchasing things the system intends to sell.

3. **Operating Expense** (OE): all the money the system spends in turning inventory into throughput.

The above measures are unlike the traditional measures; Finch and Luebbe however show that they can be converted to more conventional measures with simple mathematical operations (Finch & Luebbe, 1995). For example:

$$Net\ profit\ =\ throughput\ \pm\ operating\ expense$$

$$Inventory\ turns\ =\ throughput\ /inventory$$

$$Productivity\ =\ throughput\ /operating\ expense$$

For most service businesses throughput (T) and operating expense (OE) are appropriate measures (Siha, 1999). However, inventory (I) as defined above may not be appropriate for all service businesses.

The measures *T*, *I*, and *OE* are described as global indicators of system performance (Siha, 1999). Organizations should labour to raise overall system *T* while simultaneously reducing *I* and *OE*. However these global measures cannot be translated directly to distinct processes for application as localised measures of performance. Siha asserts that caution must be taken in the selection of local performance measures that drive individual processes in the direction of enhanced overall performance.

5.4 CONTINUOUS IMPROVEMENT BRANCH

The continuous improvement branch has two elements: effect-cause-effect (ECE) diagrams and the five-step focusing process (Siha, 1999).

5.4.1 ECE diagrams

The process of developing ECE diagrams compels managers to think about the true causes of problems. By utilizing critical thinking methods, the root cause of a problem can be identified. A plan is developed for eliminating the root cause rather than treating symptoms of the problem.

This approach answers three questions, what to change, what to change to, and how to change.

5.4.2 Five-step focusing process

The premise of the ideology behind TOC is that improvements in performance can only be achieved by focusing on system constraints. Focus is realized by a structured sequence of five steps propounded by Goldratt and Cox as shown in Figure 11 (Goldratt et al., 1992). The steps are generic in that they can be applied to any system, including service businesses.

Goldratt points out that there are two types of constraints – physical and policy states and also that 99 per cent of an organization's constraints are policies or lack of them. When dealing with policy constraint only steps 1, 4 and 5 of the basic steps are utilized (Goldratt, 1990). These steps provide a framework for management decision making that focuses on the goal of the organization. The technique emphasizes the need for change as a condition for improvement. The focusing steps are aimed at identifying areas in the organization that require change. This is another important facet of the TOC philosophy.

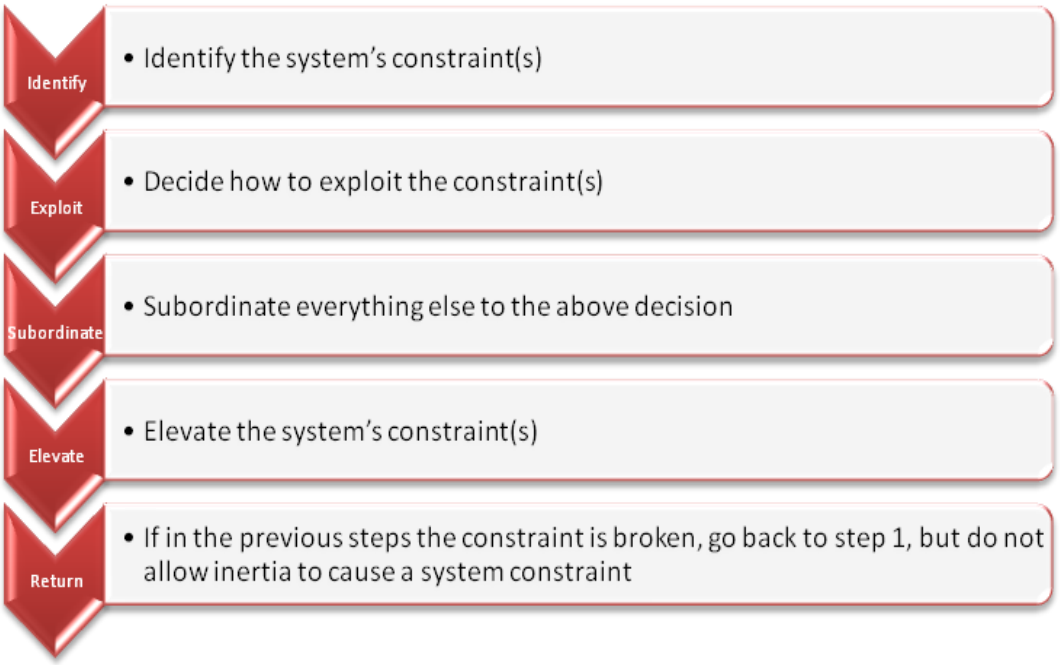


Figure 11: Five Focussing Steps for On-going Improvement

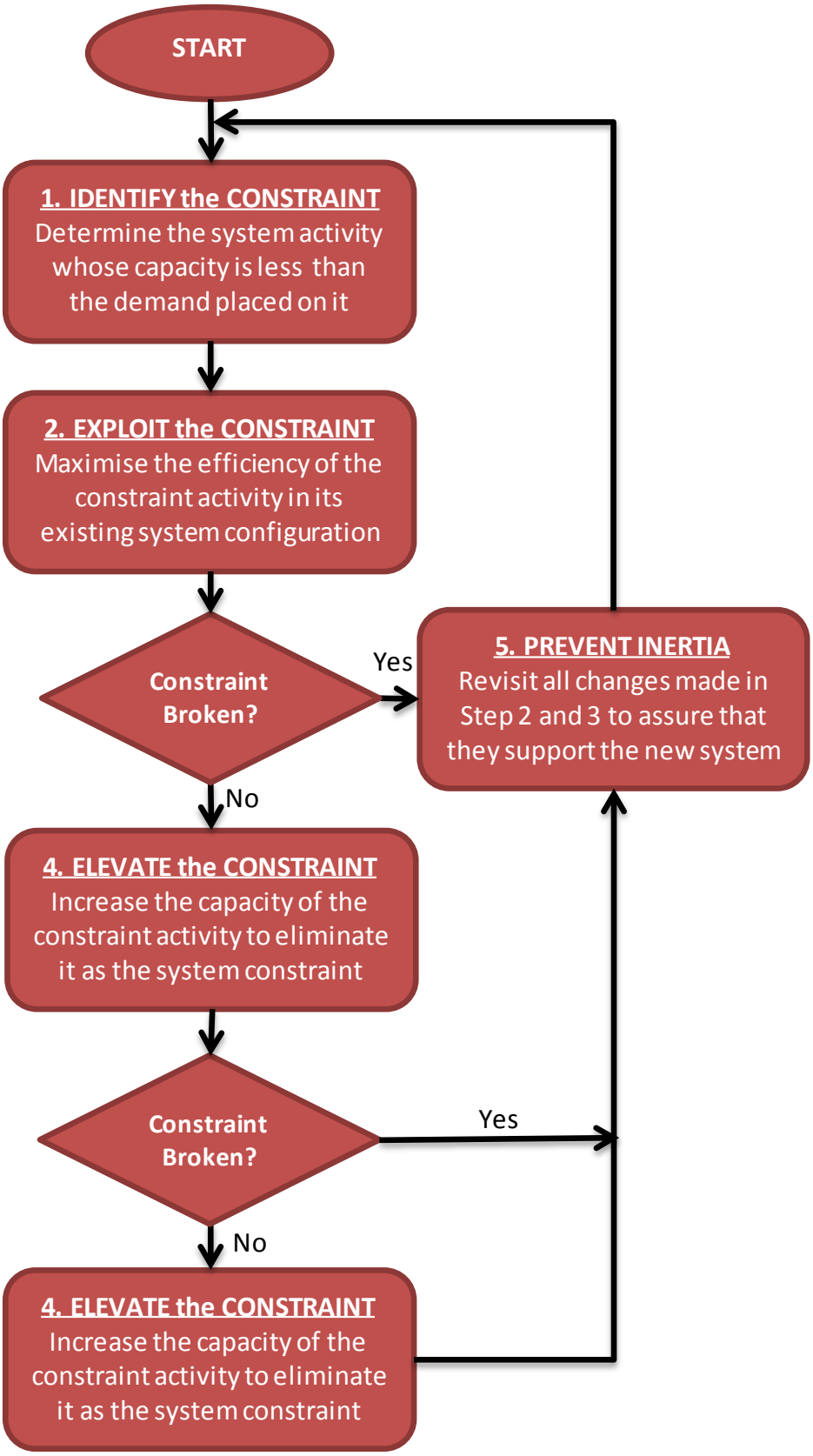
According to the TOC, the lack of clear organization goals to be followed by each functional area of the organization results in pursuit of local or, worse, personal objectives which are virtually independent of the larger objectives of the company (Klein & Harowitz, 1996). These local objectives often conflict with larger, global objectives, and improvement is slowed. In order to facilitate on-going improvements it is important to assure adherence of the entire organization to the ultimate global goals. Change in an organization can be achieved to a significant extent only if management clearly and fully realizes what needs to be changed and why. As numerous researchers have shown, the process of organizational change is one of the most difficult to achieve. In order to synchronize the initiation, creation and response to these essential changes the TOC proposes the following Socratic thinking process for dealing with change (Weston, 1991):

- What to change? – Assessment of what are the constraints to improved performance.
    - Applying the TOC to the "What to change" question often leads to the identification of an organizational constraint.
- What to change to? – devising simple, practical changes to the core problem/constraint identified. The TOC emphasizes that only simple solutions have a real chance of working in a real organization.
- How to create change? – developing strategies and actions to break undesired constraints and manage constraints in desired areas.

Figure 12 shows the general relationships between the five steps in the application of TOC. This flowchart, an adaptation of Goldratt's (Goldratt, 1990) illustration by Reid (Reid, 2007), schematically shows the sequence of activities to be pursued in managing the constraint within a system.

In order to apply the full range of TOC principles to whichever organization the five steps focusing process must be applied. There is also need to develop proper local and global performance measures and design a system for logistical control. TOC principles have been successfully applied to a variety of manufacturing organizations. Manufacturing and service systems have considerable differences; as such, application of TOC doctrines to service organizations may necessitate some adaptations (Siha, 1999).

There are two issues that TOC deals with in manufacturing that are also of importance in the service sector (Siha, 1999); namely, maintaining short-term operations as close to maximum performance as possible (logistics) and, improving long term maximum performance (continuous improvement).



Source: Reid, R.A. 2007 as adapted from Goldratt, E.M. 1990

Figure 12: TOC Five Step Focusing Process

Fundamental to the idea of TOC is that constraints, by characterization, hinder the performance of any system. An intuitive extrapolation from this idea is one can only get continuous maximum performance by steering the system against its constraints. It is worth noting that it may not be possible to concurrently drive a system against all its constraints (Siha, 1999).

5.5 THINKING PROCESS

Application of the five focusing steps to a typical production environment has been shown to swiftly produce significant improvements in operations and in profits (Noreen, Smith, & Mackey, 1995). The same is definitely true for the service environment. Policies, as a major constraints class, are generally difficult to detect and assess, and often require participation and collaboration across functional areas.

The Thinking Process (TP) is a methodology, developed recently by Goldratt (Goldratt, 1994). The TP is an approach based on common sense, intuitive knowledge and logic generic aimed at addressing policy constraints to create breakthrough solutions (Rahman, 1998a). According to Noreen *et al*, (Noreen et al., 1995) "the TP may be the most important intellectual achievement since the invention of calculus".

Goldratt outlines the three generic decisions managers are required to make while dealing with constraints as:

1. Decide what to change.
2. Decide what to change to.
3. Decide how to cause the change.

The TP prescribes a set of tools, which essentially are cause-and-effect diagrams, to get answers to these questions. The questions, associated tools and their purposes are summarised in Table 4 (Rahman, 1998a). Rahman also asserts that experts believe that TP will ultimately have the most lasting impact on business.

Table 4: TP tools and their roles

Generic Questions	Purpose	TP Tools
What to change?	Identify core problems	Current reality tree
What to change to?	Develop simple practical solutions	Evaporative cloud, Future reality tree
How to cause the change?	Implement solutions	Prerequisite tree, Transition tree

Source: Rahman, S. 1998

5.6 TOC FOR SERVICE

The managerial implications of the foundations of the TOC are so profound that it is important to also discuss these principles within the context of services theory. Reid (Reid, 2007) cites service management and marketing scholar Christian Grönroos (Grönroos, 1998) as having noted that a service firm has only interactive processes. A more recent statement by, Vargo and Lusch (Vargo & Lusch, 2004) says that physical products act as "appliances" to facilitate the delivery of services. Grönroos asserts that there is therefore a need for managers to be concerned with "only resources and a system that governs the process that produces a result for a customer" (Grönroos, 2001).

Reid (Reid, 2007) states that most managers employing TOC realize that the optimal management of a system's individual components or processes does not mean the performance of the system, as a whole, will be maximized. It is

from this view fact that the alignment of the subsystem managers' day-to-day decision-making perspective with the strategic goals of the entire system becomes essential for success.

Payne and Frow (Payne & Frow, 2005), as cited by Reid (Reid, 2007), state that customer relationship management (CRM) "requires a cross-functional integration of processes, people, operations, and marketing capabilities that is enabled through information, technology, and applications". It is their belief that the effective application of CRM involves a complete approach of managing customer relationships that simultaneously creates both customer and company value. This affiliated and harmonized style to CRM is in keeping with the TOC systemic principles (Scheinkopf, 1999).

Also, Reid (Reid, 2007) believes that possibly the sole unique aspect of the TOC managerial philosophy is the emphasis placed on identifying a few factors that actually restrict organizational goal achievement. TOC typifies systems as chains of interconnected operations or processes (Goldratt, 1988b). Managerial focus must therefore be directed toward assuring that the performance of the system's constraint is maximized. In a case study, Mabin and Balderstone (Mabin & Balderstone, 1999) identified a wide variety of goods producing firms that reported a significant improvement in performance as measured by increases in throughput and decreases in inventories, lead times, and costs. This approach has been primarily applied in production settings such as the shop floor and manufacturing support services.

Applications of the five-step focusing process are more restricted in service firms as implementations of the five-step focusing process remain quite limited in service the service industry (Reid, 2007). As an example within the premise of this study, Bramorski *et al.* (Banking, 1997) applied TOC thinking to the banking industry.

Other examples of service industry TOC application include:

- Karapetrovic *et al.* abstracted a university as a production system and identified equivalents for applying TOC principles (Karapetrovic, Rajamani, & Willborn, 1999).
- Olsen used TOC principles at a security service firm to increase profitability by focusing on constraint management (Olson, 1998).
- Gillespie et al. applied the five-step framework in a sales-quoting process (Gillespie, Patterson, & Harmel, 1999).
- Spencer describes several TOC applications at an information service provider for independent livestock producers (Spencer, 2000).
- TOC applications are also documented in the public sector or non-profit organizations have occurred primarily in the health sector, for example are cases detailed by Wright and King (Wright, King, & Goldratt, 2006), Breen *et al.* (Breen, Burton-Houle, & Aron, 2002) and by Womack and Flowers (D. E. Womack & Flowers, 1999).

5.6.1 A TOC approach to service organizations

Several authors (Goldratt, Fox, Goldratt, & Goldratt, 1986; Weston, 1991)(Reimer, 1991)(Ramsay, Brown, & Tabibzadeh, 1990; Schragenheim & Ronen, 1990) investigated and proposed implementations for the TOC

philosophy in organizations which manufacture products. The theory has already been implemented successfully in several manufacturing organizations and some techniques such as the Drum-Buffer-Rope method have been developed to support implementation of scheduling and decision making on the shop floor (Goldratt, 1988a). Results showed significant improvements in throughput, on-time shipments, inventory turns and other important factors which have direct influence on companies' bottom lines. A question arises whether the TOC is applicable only to manufacturing organizations or whether it encompasses service-type organizations as well. Other modern management philosophies such as TQM have been found very applicable and have been successfully implemented already in service organizations. Can service organizations benefit from implementation of the TOC?

First one needs to consider the basic crux of the theory which is the existence of organizational constraints. Coming from the manufacturing viewpoint, people tend to identify constraints as physical – not enough machining capacity, limited floor-space, lack of materials and other factors. In fact, experience shows that most constraints in organizations are policy or procedural constraints rather than physical (Goldratt, 1990). In many cases, what limits or sometimes even diminishes the performance of an organization are actually the organization's management policies and operational procedures (Klein & Harowitz, 1996). As a simple example, capacity can be limited by an operational directive forbidding overtime. Service may be hindered as a result of the immediate service provider not

being authorized to approve or perform certain necessary actions. Frequently the biggest and most immediate gains in performance may be achieved by thoroughly identifying and changing harmful constraints in the organization. By providing a systematic questioning method to reveal and clearly describe problematic areas that supposedly are implicitly known to all, the TOC can be usefully applied not only to manufacturing industry but also to the service industry.

The intent of deploying the TOC is not to underestimate the importance of operating procedures and policies to organizations. They are crucial in service and manufacturing organizations to guide actions and behaviour, and to provide solutions to specific problems. However, they seldom are modified when the external environment changes. Some are so rooted in the organization that they are difficult to attack. The Socratic thinking process proposed by the TOC handles the inherent resentment to change by using a sequence of questions leading to self-revelation and creating a sense of ownership.

Next, there is need to examine the notion of on-going improvements. The TOC holds that only improving the weakest link in the chain will create the desired effect on the organization's bottom line. To measure the effect of actions, one must first concentrate on defining the organization's goal. In manufacturing, one already identified the ultimate goal as making profit. How would one measure goals in service type organizations? For most of the service industry, one can continue to define profit as the organization's goal. Dealing with daily measurements, however, becomes a more difficult issue.

Throughput, for example, is ordinarily considered to be a manufacturing term that has to do with the flow of products along a production line. Service organizations do not manufacture products. They do not carry limited capacity machinery. Some not-for-profit organizations are not even interested in making money. In order to apply the TOC therefore, there is need to re-evaluate and define the basic measurements needed to guide decisions and provide essential feedback on improvement.

This can be begun by trying to present a basic service organization as a system. A system is basically a process, or a series of processes, in which inputs are turned into desired outputs.

The TOC defines two basic inputs as inventory and operating expenses, and the output as throughput (Goldratt, 1990).

5.6.2 Drum-buffer-rope control for a service organization

It has been categorically shown that the basic philosophy of the TOC is generally applicable to service type organizations (Klein & Harowitz, 1996). Goals should be clearly identified, correct measurements should be taken, and the constraints, be they physical or policy, need to be carefully managed or changed to assure on-going improvement. It is of interest to check whether some of the practical methodologies developed for the application of TOC in manufacturing can be adopted for use in the service environment. The drum-buffer-rope shop floor control technique now being implemented in a growing number of manufacturing organizations enables better scheduling and decision making on the shop floor (Klein & Harowitz, 1996). As described by Schragenheim and Ronen, the drum is the exploitation of

the constraint of the system; the constraint that dictates the overall pace of the system (Schragenheim & Ronen, 1990). The constraints may be a resource, market demand, scarce raw material, or management policy. The important thing is that the drum has to include a detailed schedule in order to assure full exploitation of this constraint.

A buffer may be defined as protection time. Buffers are used to protect critical areas, such as the constraints from disruption of their operation. Disruptions may occur as a result of problems such as breakdowns, unreliable suppliers, set-up time fluctuations or unavailability of resources (Motwani, Klein, & Harowitz, 1996). A rope is a mechanism designed to force all the links of the system to work up to the pace dictated by the drum and no more. In manufacturing implementation, this is done by creating a detailed schedule for releasing raw material onto the shop floor.

The drum-buffer-rope technique stems from the theory of constraint's five step on going improvement cycle provided in Figure 11. Geber describes the case of the University of Michigan Hospital, which tackled the problem of an inefficient admission and discharge system. Delays in discharging patients caused an average of three hours' delay in accepting incoming patients, who had to wait for their rooms to be prepared. A cross-functional team was able to find several ways to reduce the complexity of the admission and discharge system and improve the process (Geber, 1992). Initially, the hospital cut the average admission time from three hours to 21 minutes and then to 11 minutes. One of the key methods for achieving such dramatic improvement was better scheduling of housekeepers for cleaning dismissed patients'

rooms by the utilization of beepers. Clearly, by identifying and better exploiting the constraints with the aid of a "drum-rope"-type mechanism, the hospital was able to cut down on the inventory of non-admitted patients and to increase its output. According to Geber, the cross-functional team is still in operation, and has the goal of zero admission time – from the hospital's door directly to the patient's room (Motwani et al., 1996).

In another example provided by Geber, the University of Michigan Hospital significantly improved the utilization of its operating rooms by the use of a drum-buffer-rope-type solution. The hospital's operating rooms were running inefficiently at more than capacity (Motwani et al., 1996). After analysing the scheduling process and identifying the constraints, a hospital team made several significant changes. The operating room schedulers were assigned to work exclusively with a particular group of specialists, so that each scheduler could become familiar with each doctor who practised that specialty. The scheduler, for example, would know that if a certain doctor asked for 15 minutes he should reserve at least 30 as a buffer. In addition, operating room clean-up teams were established to expedite clean-up after each procedure.

It is clearly evident from these examples that techniques and methodologies developed originally for manufacturing organizations can be adopted and used in service operations. These applications require a certain degree of abstraction. However, abstraction may sometimes be a necessary ingredient of any thinking process to ensure its success.

5.7 CONCLUSION

The framework of the TOC rests on the premise that an organization must always have constraints that limit the organization from achieving higher performance in terms of its goal. Constraints must exist, or else performance would be unlimited. The TOC identifies the weakest links within the organization as constraints (Klein & Harowitz, 1996). As defined by Umble and Spoede (Umble & Spoede, 1991), "TOC is an overall management philosophy which emphasizes constraints identification and management as the keys to focusing limited time and resources on areas where potential returns are greatest."

The application of the five-step focusing process has been somewhat limited in service sector firms and in support processes for manufacturing organizations. The five step focusing process was initially formulated and effectively applied in the manufacturing sector and, as a result, was considered by many to be tightly linked to the production environment. Resultant to this, the management approach had not been pondered as a viable structure for streamlining service sector organizations or processes. Service industry also has some unique features that appear to make management more challenging. Also true is that the enormous bulk of organizational constraints are not physical in nature but rather, self-imposed, rules or policies that limit goal achievement. As a result of this, the five-step focusing process will almost always include policy changes somewhere within the organization.

Theory of Constraints

The basic ideology behind TOC can be employed to advance the performance of service organisations. As Siha asserts, the essential step is to identify the flow of ``material'', inventory and throughput at various service organizations of the four quadrants of the service matrix (Siha, 1999). The meaning of these terms might be reliant on the specific service considered. The acknowledgment of the composition of an organization's constraints is the first footstep on the road to continuous improvement since system constraint is at the core of TOC (see Table 5). Constraints are mostly found to be inherent in policies and procedures rather than capacity or equipment (Siha, 1999). Granted, the DBR methodology was devised as a governing system for the shop floor, it can however still be adapted to service organizations and used to exploit the system constraint and subordinate the resources to it. Table 5 summarizes the application of TOC to the four service types in the service matrix. Table 6 summarizes the TOC unique solutions to numerous service setups. The characteristics of the service organizations are universal so the TOC applications can and have been shown to be exploited universally.

Table 5: Applying TOC to the Four Types of Service Organisations

Service Type	Constraints	Inventory	Throughput
Service factory	Scheduling – balancing capacity and demand	The "unused" services, e.g. unsold seats in airlines	The income generated from selling the "service", e.g. tickets, rentals, ...etc.
Service shop	Handling the customisation of the service and the stochastic process time	The turnover rate, e.g. tables in restaurant or space in repairing shop	The income generated from offering the "right" service to customers
Mass service	Controlling the policies and processes	The "delay" in delivering services, e.g. insurance policy not issued on time	The income generated from "timely" delivery of the service
Professional service	Matching "workforce" and demand	The utilised human resource capacity, e.g. doctors need to keep their schedules full	The income generated from "adequate" utilization of the "workforce"

Source: Siha, S. 1999

Management philosophies used by manufacturing organizations can therefore be applied to improve the performance of service-oriented

organizations, even those which are not for profit (Motwani et al., 1996). The concepts outlined by TOC can be used effectively to identify the organizational goal, locate the constraints to achieving maximum performance, and develop practical measurement to assure a process of on-going improvements in the direction of the global organization goal.

Table 6: TOC Solutions

Service Type	Issues and problems	Inventory
Service factory	Capacity decisions Demand management On-time delivery Hierarchical structure Policy constraints	TOC develops the causal relationship between the individual process and the global goal, thus, greatly improving on-time delivery and increasing throughput DBR controls the release of items
Service shop	High mix and variety of services High degree of customisation Lack of standard processing time Hard to schedule	DBR avoids the problem of lack of standards by scheduling only the constraints, thus, greatly reducing the amount of data needed Buffer management ensures the bottleneck is not idle. This is done by "setting the rope" to control the arrival of "items" at the constraint
Mass service	Workforce scheduling Growth management	Applying the five-step process to properly schedule workforce and manage capacity Applying TOC measurement system, e.g. moving the labour wages from the cost of sales to the operating expenses. This allows companies to recognise their true marginal cost, which leads to competitive pricing
Professional service	Scheduling Peak demand management Capacity management	Exploiting the constraint by using "triage" Buffer management to keep the "professional" busy Exploiting the constraint by shifting some responsibility to lower level skill

Source: Siha, S. 1999

Since constraints are frequently found to be policies and procedures rather than capacity or equipment, the same thinking process can generally be used in manufacturing and service environments. Service organizations can be modelled as systems with measurements comparable to manufacturing. Metrics such as throughput, operating expense and inventory can be identified in order to measure progress towards the global organization's goal.

Although requiring a higher abstraction level, even shop floor control techniques, such as the drum-buffer-rope methodology, can be applied to service organizations in support of effective exploitation of constraints and subordination of resources to it.

CHAPTER 6

ABSA PROCESS IMPROVEMENT FRAMEWORK

6.1 INTRODUCTION

Barclays Africa is the business culmination of the marriage witnessed between Barclays and Absa. Since its inception Barclays Africa has gone through targeted and powerful transformations aimed at achieving the goal of becoming the "Go-To" bank. The "Go-To" journey is based on the firm foundation of the Barclays Leadership System and "One Africa" strategy. Key to the process of achieving this goal and realising the "One Purpose" are the "RISES" values; an acronym representing Respect, Integrity, Service, Excellence and Stewardship respectively.

Barclays Africa leadership has, further to the need of building confidence and fostering open, involved and honest internal engagement, identified Operations as the key focus area if the journey towards becoming the "Go-To" bank is to be a success. As such Africa Operations was ear marked as the veritable engine to drive the organisation in this "Go-To" Journey. Operations need to be kept abreast of market trends and meet the demands accordingly. Indeed the digital age brought in new security and compliance

challenges for the banking industry, however the mantra "Digital or Die" illustrates the vast opportunities that are also available in the area. The Absa Online banking application is a good and recent testament to the business embracing digital channels.

Africa operations, in their journey to creating a Lean Organisation, are also leveraging technology to streamline everyday operations. There are solid steps towards operations integration and the realisation of a truly paperless end to end process.

Barclays Shared Services Africa (BSSA), as part of the operations space, is responsible for the processing operations of the business. In more ways than one they are tasked with fulfilling the promises made to the customer at the front office. BSSA enables the front line by assuming the administrative tasks that take away from their core business of serving the customer. Targeted monitoring and control measures, like the now embedded Balanced Scorecard, have been implemented throughout the business. As such the eclectic leadership of the organisation are continuously challenging their loyal and dedicated "minions" to strive for sustained improvements in operations and enhancement in the customer experience.

The prime driver for operations is the goal of enhancing the customer experience by stimulating and driving transformation in the business. The journey towards the branch of the future demands that Operations free the front office from virtually all administrative tasks so they may concentrate on their core business of serving the customer. The paradigm shift from viewing customer service as delivery of "monetary figures" to the "facilitation

of life events" is enhancing the banks value proposition and should indeed ensure that the bank will "help people achieve their ambitions – in the right way".

6.1.1 One Africa

Africa is a significant growth opportunity for Barclays and Barclays Africa Group's (BAGL) ambition is to build the "Go-To" Bank in Africa through its leading market presence to drive superior earnings growth, on an efficient and scalable cost-to-serve platform.

Africa is the second fastest growing region in the world with a low banking penetration and a largely unbanked population. Barclays Africa operates in 13 countries, as shown in Figure 13, and the challenges on cost, control and service delivery are similar.

Figure 13: Barclays Africa Penetration

South Africa has been identified as a strategic base for location-cost-efficiency operations optimisation; a process aptly termed "right shoring". The country offers a talented labour pool, favourable time zone, as well as

tax and incentive benefits. BSSA has since been established in SA as one of the global execution hubs, where the existing infrastructure and scale can serve BAGL efficiently and be leveraged to serve the wider Barclays Group.

6.1.2 Vision and Ambition

The vision of BSSA is "To become the best Shared Service organisation" within the Barclays. The associated ambition to achieve this vision has multiple facets which include:

- Customers developing an emotional connection with BSSA due to consistency and knockout experiences;
- Colleagues being attracted to work in BSSA's great environment with abundant career opportunities;
- Barclays recognising BSSA for setting new performance benchmarks and innovative solutions;
- Communities benefiting from BSSA's involvement in their own empowerment and upliftment;
- Having a conduct that will differentiate BSSA from our competitors.

6.1.3 Strategy

BSSA's strategy for realising its Vision and Ambition includes going through the aggregation and centralization of common processes in scale locations. This is aimed at delivering highly efficient and effective customer focused service in partnership with clients. Figure 14 shows the summary of the BSSA strategy.

Absa Process Improvement Framework

Figure 14: BSSA Strategy Summary

BSSA's engagement model, as shown in Figure 15 , is based on fostering strong partnerships between the clients and business. The aim of the engagement model is to create a clear understanding of objectives, expectations and customer outcomes.

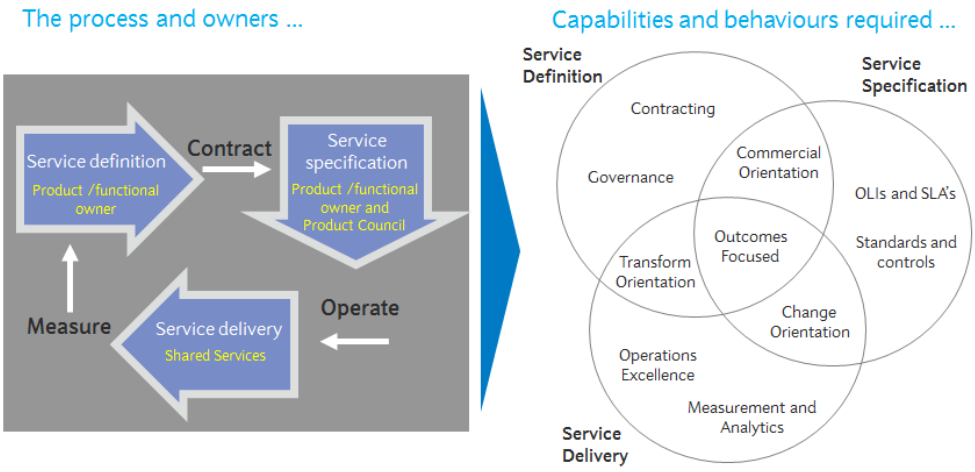


Figure 15: BSSA Engagement Model

As part of a global shared services capability the BSSA operating model, illustrated in Figure 16, provides the framework to assemble processes into a service delivery model that is focused on requisite business outcomes

captured in service level agreement (SLA) and operational lead indicators (OLI).

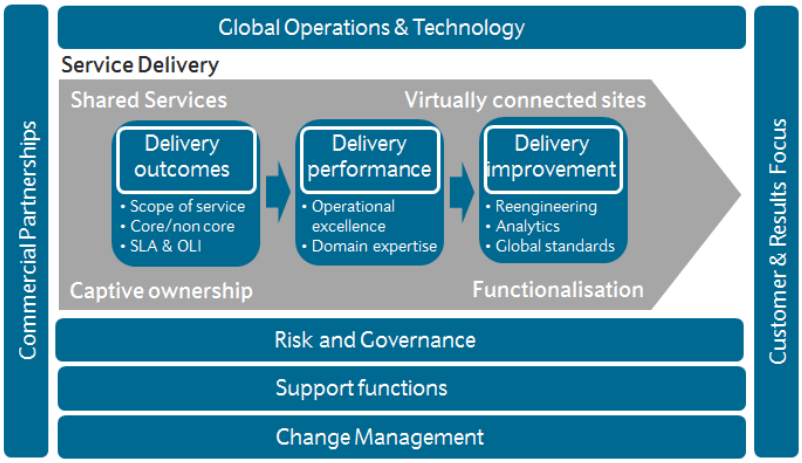


Figure 16: BSSA Operating Model

BSSA have built a diverse portfolio of services delivered across five core functions, ranging from mainstream voice and data processing, to higher end specialist and knowledge process outsourcing.

BSSA's location journey towards scale operations is closely aligned to the global operations right shoring agenda. After the consolidation of a targeted mix of voice and data processes in two main hubs in 2014, the focus will shift towards resilience and cost efficiency through continuous improvement.

6.1.4 The "Go To" Journey

The goal of the Barclays Africa Group is to build not only a sustainable, trustworthy business, but a business that their customers and clients consider as the first choice for solutions in Africa, i.e. their 'Go-To' bank. It is the strategy to see customers and clients benefit from the focus on doing business in the right way, putting them firmly in the centre of all that the

business does. For the Group and its shareholders, 'Go-To' is translated to mean a more efficient way of doing business and developing deeper relationships that sustainably improve return on shareholder investment.

A wide-ranging plan, called the Transform Programme, led by the Chief Executive of Barclays and driven, in Africa, by the Group Chief Executive of Barclays Africa and senior leadership throughout the continent, sets out the route through which the bank will become the 'Go-To' bank for customers, clients, colleagues and the community.

6.1.5 The Transform Programme

The Transform Programme, comprising 10 project streams led by senior leaders from across the bank, was fully launched with all projects having been specifically tasked with defining the path to achieving the 'Go-To' bank vision as a short to medium term goal. It is as part of this programme that Barclays launched its Purpose and Values in January 2013.

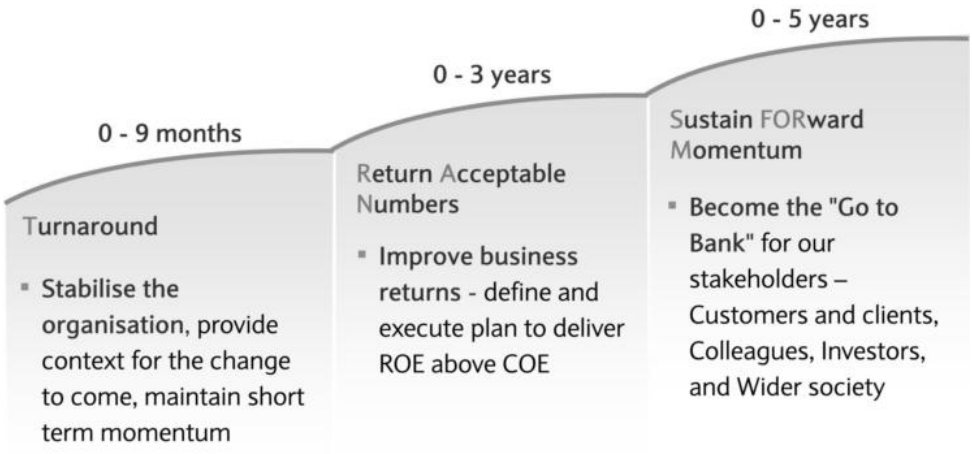


Figure 17: TRANSFORM: Overall Goals

Demonstrable action is at the centre of what is known as the Transform Programme. Transform is made up of three work streams, which will deliver three overall goals as shown in Figure 17.

The 10 programmes instituted by the Barclays group under the Transform umbrella are as highlighted below:

1. **Business Portfolio Review** – Aimed at determining the future shape of Barclays' portfolio of businesses that meet their goal to be the 'Go-To' bank and which will deliver sustainable returns above the cost of equity.
2. **Controls Review** - Design and build a new Control Architecture for the Barclays Group that is considered best practice in the industry and meets the requirements and expectations of regulators.
3. **Operations and Technology Operating Model** - Deliver an operations and technology model which enables Barclays to fulfil its ambition to become the 'Go-To' bank in the most efficient and effective manner, given where they are today, current initiatives and regulatory mandates.
4. **Cost and Business Efficiency** - Delivering structural cost and business efficiency by introducing "Go-To" client and colleague processes, and leveraging Group synergies.
5. **Capital, Liquidity, and Funding** - Drive improvements in the management of the Capital, Liquidity and Funding resources of the firm through a structured program in partnership with the businesses

to deliver a market leading response to the new regulatory and market landscape.

6. **Culture and Values** - Establish and embed a culture that is underpinned by a common purpose and clearly articulated set of values as a critical component of becoming the "Go-To" bank.
7. **Talent and Reward** - Redefine and implement changes to Barclays' Talent, Performance and Reward policies & practices in order to support the delivery of Barclays strategy to become the 'Go-To' bank, by attracting, retaining, developing and incentivising colleagues with the talent to deliver the strategy.
8. **Balanced Scorecard** - Develop a Balanced Scorecard for the 'Go-To' bank which ensures delivery across the 5C's: Customers & Clients, Company, Conduct, Citizenship and Colleagues.
9. **Regulatory Relations** - Ensure we have the culture, capabilities & processes in place to meaningfully improve regulatory relations such that we become a model of constructive engagement.
10. **Reputation Management** - Improve our capabilities in mitigating and responding to reputational risks and issues in support of becoming the 'Go-To' bank.

6.2 PROCESS IMPROVEMENT FRAMEWORK

BSSA has made deliberate and conscious effort to fully develop and promote a PI framework until it reaches business as usual status across the entire business. This embedding of process improvement into the "DNA" of the

organisation is what should ultimately lead to enhanced process and framework maturity in the organisation.

The Global Business Transformation (GBT) team in BSSA applies LSS as the core process improvement methodology to be applied in their process improvement framework.

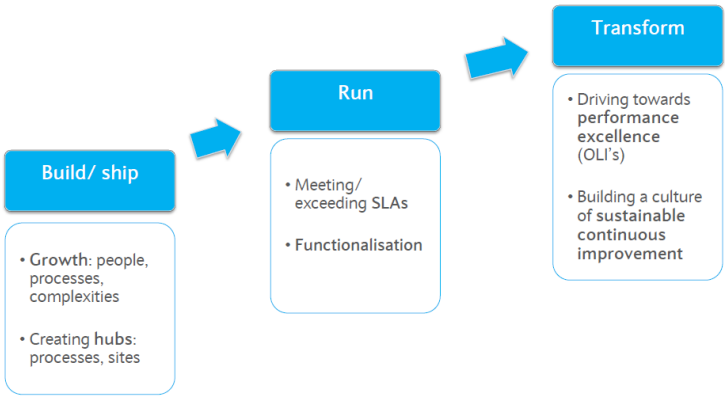


Figure 18: Shared Services Journey

6.2.1 GBT Practice Model – Portfolio Alignment

The GBT practice model, initiated early in 2013, is now well established and has ably supported the growth and transformation journey of shared services. There was a need to refresh and re-align the operating model to support further growth and achieve transform targets. The review of the model was aimed at further enriching the work profile of the GBT team by providing a platform that enables professional and individual growth. The growth required should be achieved by lifting a consultant's profile from just managing projects to leading and supporting business portfolios.

Consultants were therefore made responsible for leading PI activities and driving the CI culture within their assigned portfolio (BU level). The core tasks of the portfolio managers are:

- Engage BU Head on frequent basis and lead discussion on PI progress, quality DNA & support required
- Responsible to train and coach White Belts
- Support Pitch In campaigns and drive idea conversion within the enabler network
- Continue to deliver Black Belt level projects to support 'TRANSFORM'

The key annual metrics established for each GBT consultant include the total WB trained population in BSSA, WB projects closed, QNI contribution, Number of Green Belt projects done, Pitch In[1] idea conversion.

6.2.2 Continuous Improvement Culture framework

Outputs from the strategy session held with business heads highlighted two key drivers for building a CI culture within BSSA, namely Leadership and the need for an Enablement framework.

The model shown in Figure 19 was formulated and incorporates the key pillars to formulate a CI framework for sustained transformation through PI. As suggested by literature colleague development and empowerment were also indicated as key pillars of an effective CI framework.

[1] Pitch In is a process improvement idea crowd sourcing platform described later in Section 6.6

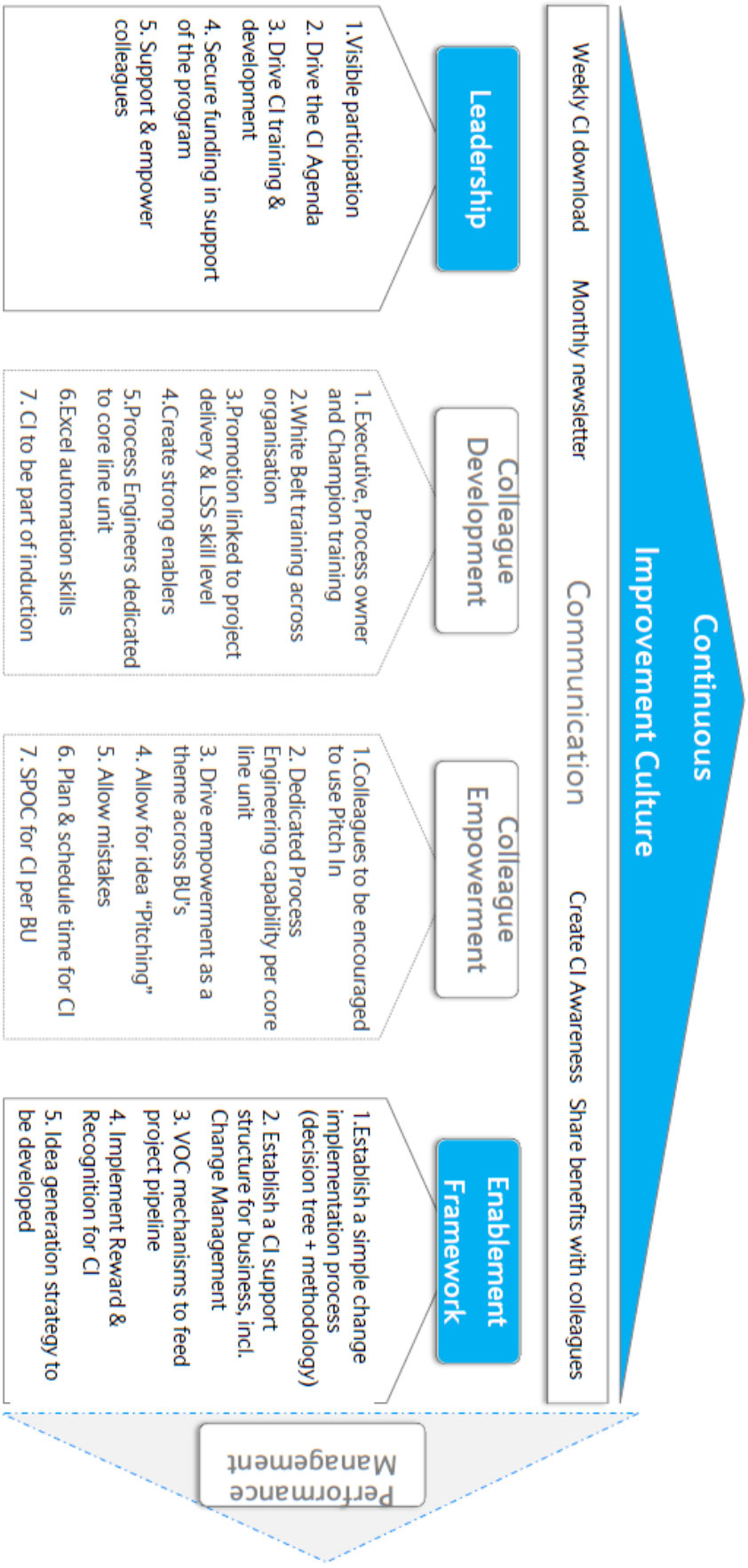


Figure 19: CI Culture Framework

6.2.3 BSSA Performance Improvement Governance

Successful integration and execution of a performance improvement program requires strong governance throughout all phases of a project. This level of integration and governance will ensure timeous execution of projects, resulting in success for business and the PI team. Various stakeholders with in the business play a role throughout the cycle of a project as displayed in Figure 20.

6.2.4 Project and Process Governance

A performance improvement project requires strong governance and stakeholder engagement to ensure successful implementation with sustainable results. The model shown in Figure 21 highlights the key milestones (tollgates), coupled with tasks, through the full cycle of a project, and predominantly led by a GBT resource.

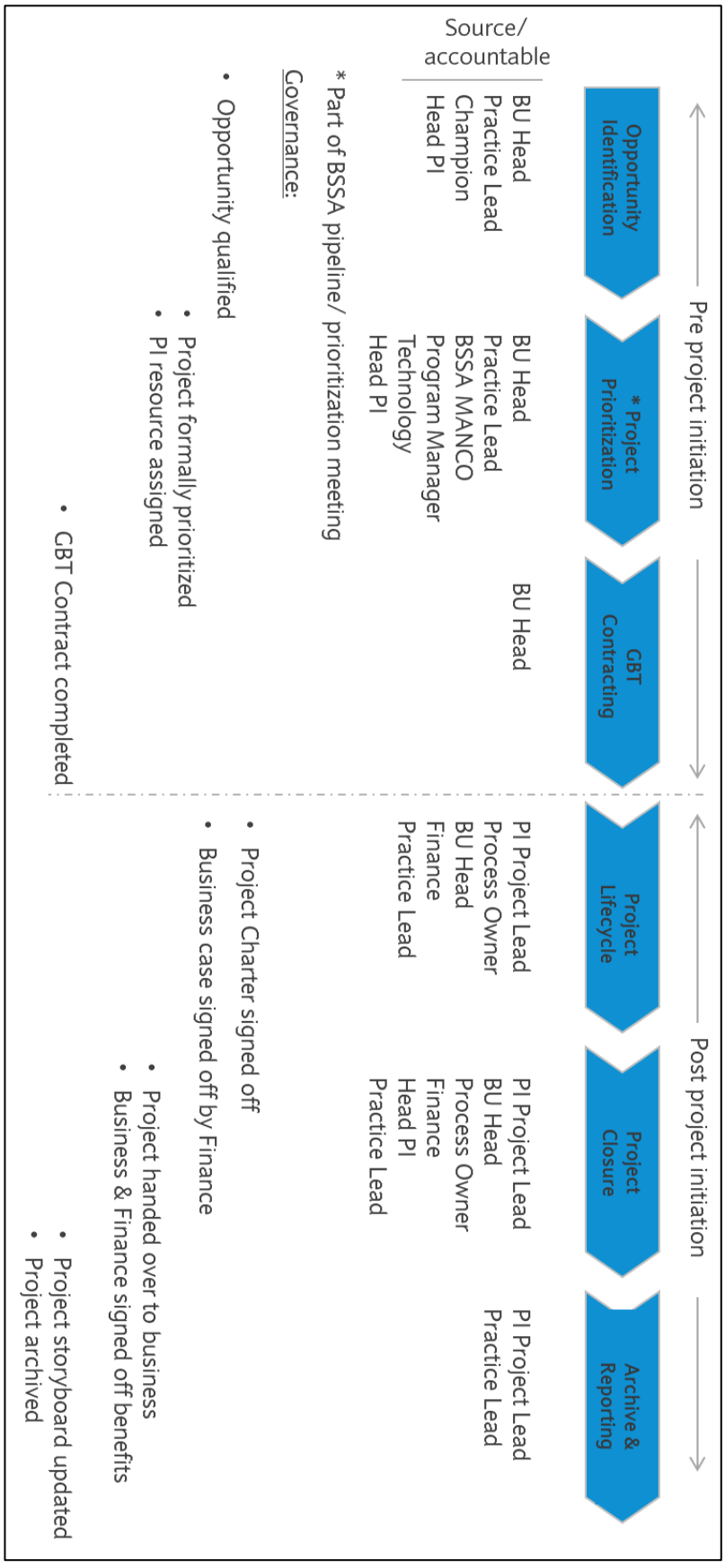


Figure 20: BSSA Project Life Cycle

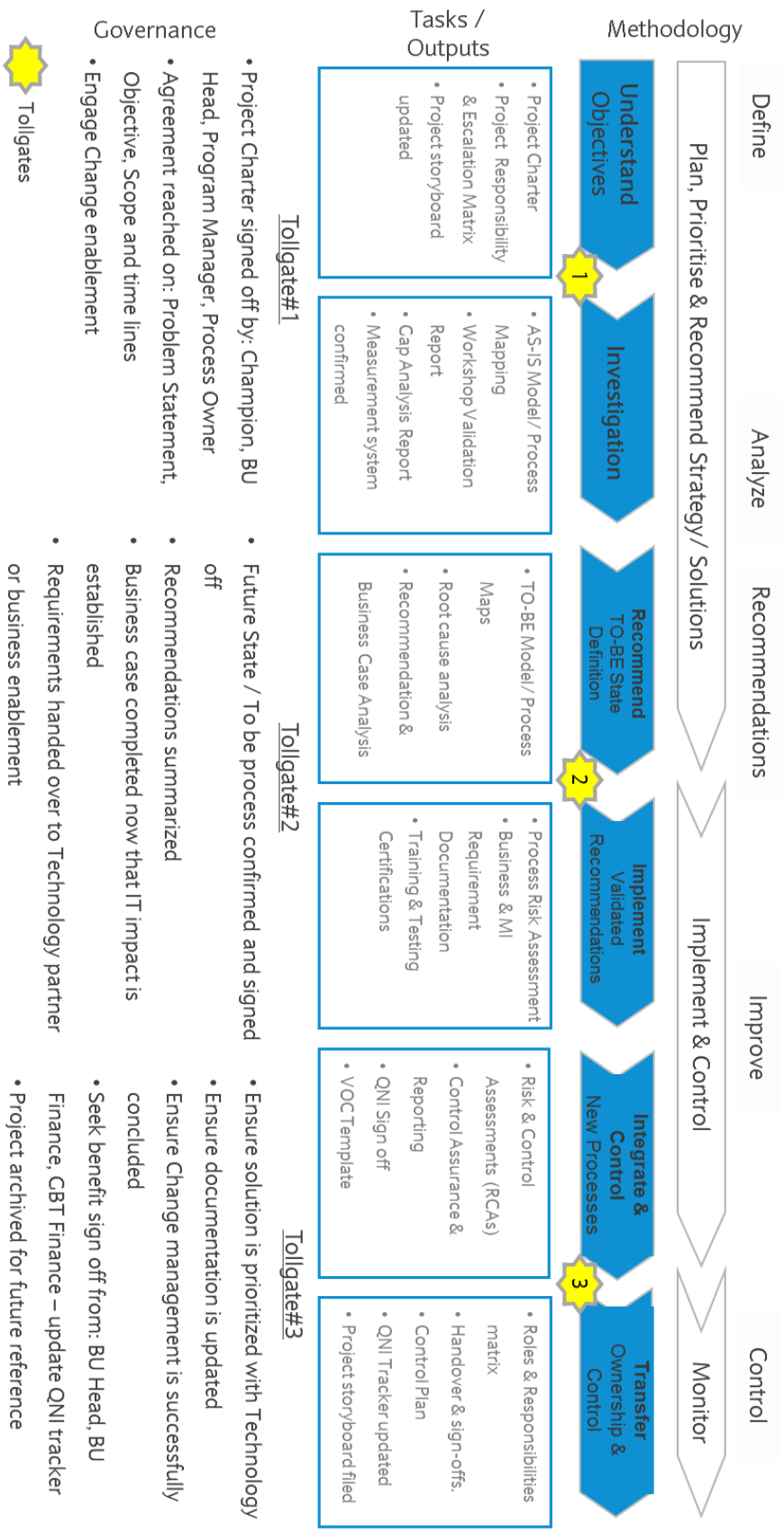


Figure 21: PI Methodology and Governance

6.3 BUILDING PI CAPABILITY IN BSSA

The imperative for building PI capability in BSSA, was highlighted by, but not limited to, the following factors:

- Poor customer experience;
- High cost to serve;
- Complex, inefficient & broken processes;
- Projects and associated savings take too long to implement and realise;
- PI skill not industrialised and not scalable.

These factors clearly demonstrated the need for a PI development program that enables capability build within and across the business. Further to this, colleague development was also identified as a critical supporting pillar to drive CI across BSSA. Figure 22 shows the CI development program designed to educate BSSA staff in the basic disciplines of continuous improvement. This programme is aimed at equipping staff to run mini projects (kaizen events for team members) and to use more complex tools and methodologies (full time LSS practioners).

Given the state of the market and the underlying business problem and acceleration of the speed of business transformation was required as continuing with the “as-is” operating model would not solve the problem. Rapid intervention was therefore required to build capability within the business.

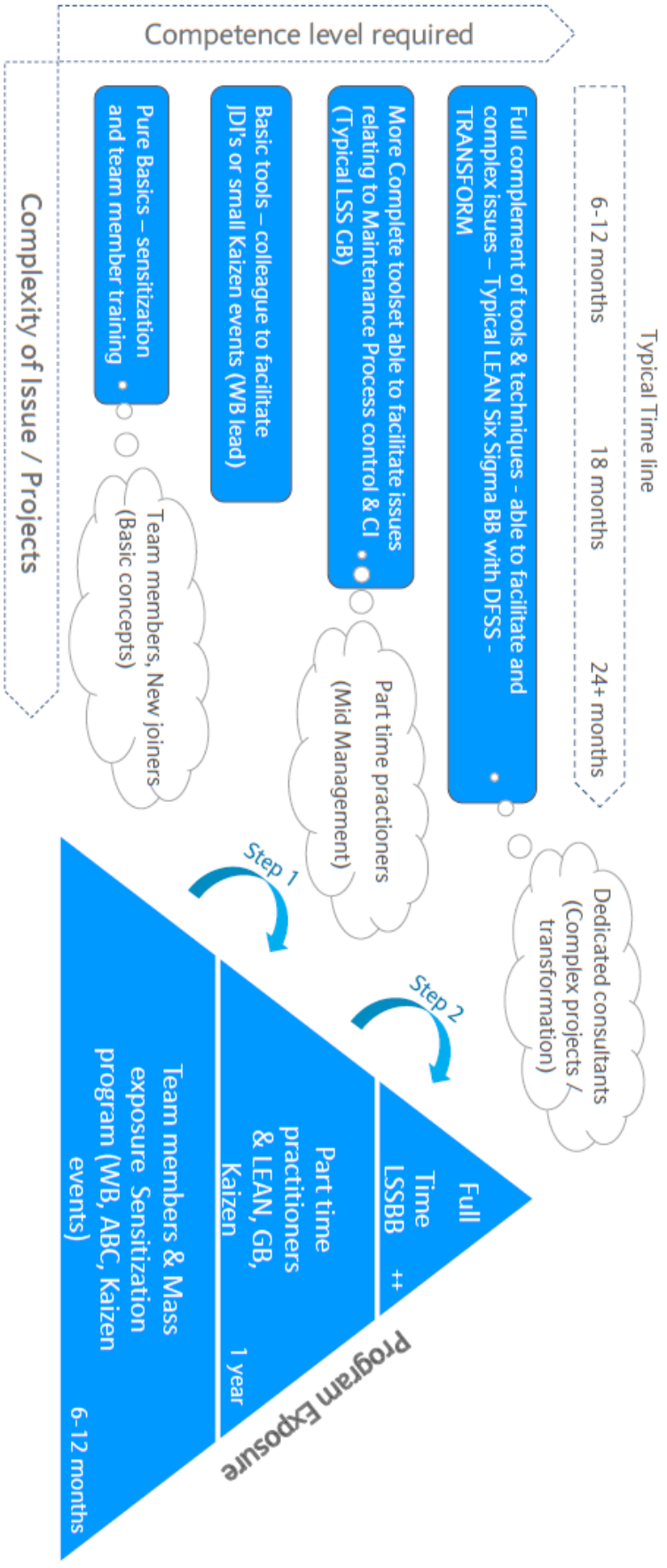


Figure 22: CI Staff Development Framework

Absa Process Improvement Framework

In the 2012/2013 financial year the PI team was built to credentials and the capability proven. This resulted in highly effective and marketable results, albeit slow. No possibility existed to industrialize or scale PI skill and methodology to meet transform needs. The PI capability roll-out was a process whose approach would not embed a sustainable continuous improvement and innovation culture

The 2014⁄2015 journey was therefore focused at building PI capability within and across business to ensure that the PI culture is embedded strongly. The need was to up skill the existing PI embedment and add to stock with specialism. A training and development plan would be core to fasten capability build thus an external consultancy, BMGi®, was engaged to lead skill development and infrastructure over an 18 month period. Internal Master Black Belts will then be developed to take over and own the PI deployment with little or no reliance on the external consultants.

The roadmap was developed considering the needs of the PI team and potential top candidates nominated from business with a view to train up to Lean Six Sigma green belt level in partnership with BMGi®, the training, coaching and mentoring partner.

Figure 23 shows the typical capability development timelines as recommended and implemented by BMGi® in BSSA.

Figure 23: PI Capability Development Timelines

The BMGi® Lean Six Sigma DMAIC roadmap allows for the solution of complex problems (BMGi®, 2010). In situations where the problem and solution are known a Lean SCORE Event framework is deployed for making important improvements. The two approaches can also be blended in certain situations.

As a general rule a project manager needs to take themselves through a decision pathway to confirm that Lean Six Sigma is the way to go (DeCarlo, 2005). The first question to ask is if the business has a basic process management system in place; if none exists then one needs to be created. The act of walking the process counts for the early makings of a process management system.

The decision flowchart illustrated in Figure 24 (BMGi®, 2010) is used to confirm the methodology best suited to solving a business problem. The confirmation of the methodology required hinges around whether or not the

root cause of the performance problem is known. In the scenario that the solution to the problem is obvious a "Just Do It" approach is used by simply implementing the changes that are known to be needed.

Figure 24: Methodology Selection Roadmap

Where root causes and solution are not known then either some solution should be brought on by Innovation methods or some solution brought on by Lean Six Sigma. At this point in the flowchart if the root cause is not known then a DMAIC Lean Six Sigma project needs to be implemented. In the case where the root cause is known (but not the solution), a Lean Six Sigma SCORE Event is required, as shown in Figure 25 (BMGi®, 2010). In the scenario where the root cause is known and a brand new process or product is required then Design for Six Sigma or some other Innovation method can be deployed.

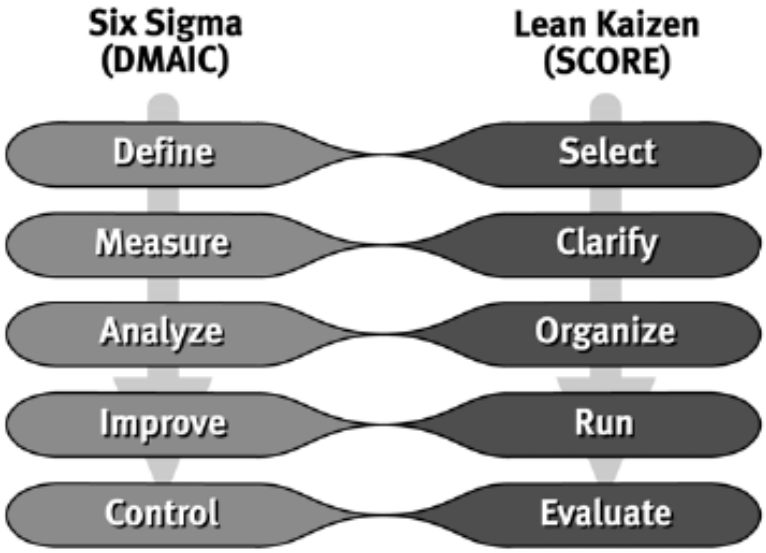


Figure 25: DMAIC versus SCORE Methodology

The key to success is therefore to use the right methodology for the right type of performance improvement opportunity. Figure 26 (BMGi®, 2010) shows the overview of what each phase of the DMAIC process aims to achieve.

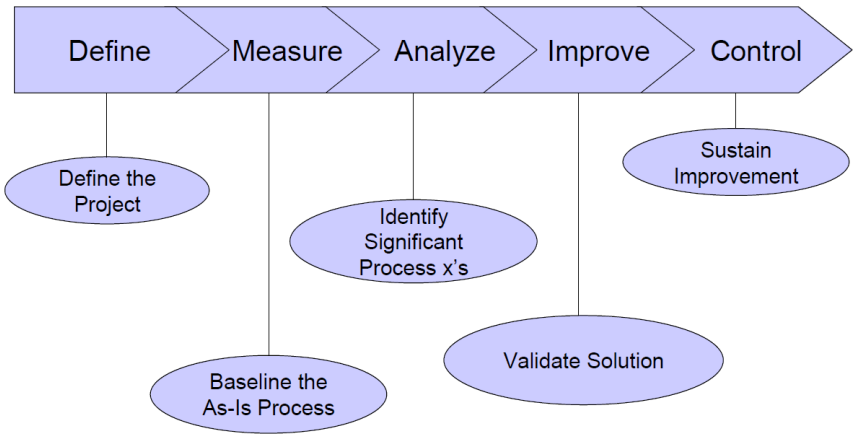


Figure 26: DMAIC Overview

The BMGi methodology defines in greater detail the deliverables that are required as shown by the roadmap in Figure 27 (BMGi®, 2010) . Check points are deployed at the end of each phase to ensure that all relevant deliverables are produced and evidenced before any of these governance toll gates can be passed.

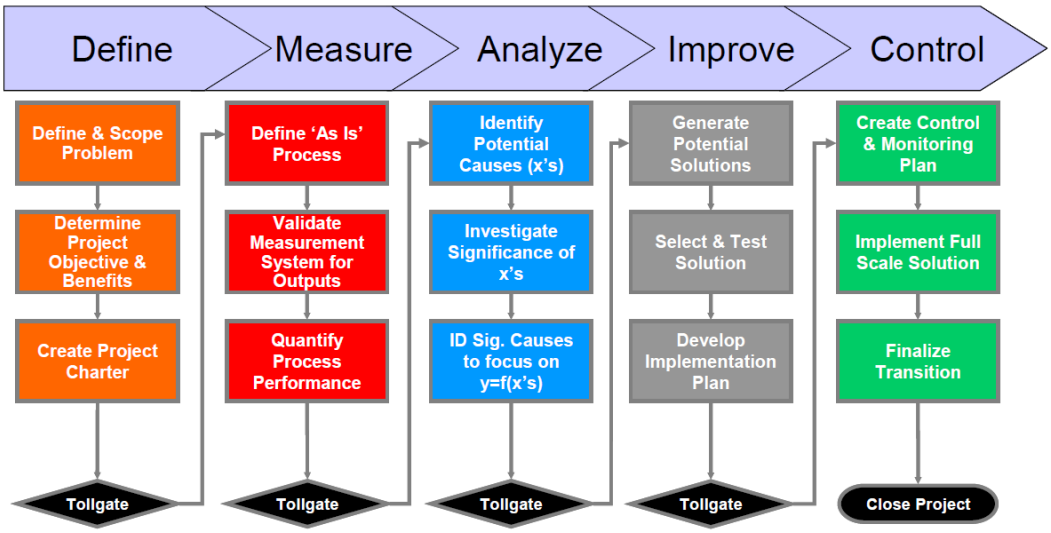


Figure 27: BMGi DMAIC Roadmap

6.4 WHITE BELT PROGRAMME

A LSS White Belt programme is currently running in BSSA with the objective to improve the quality DNA in the organisation. This will be achieved by empowering staff to self-drive improvements through training on basic lean Six Sigma toolkit. Candidates are developed to the point that they can lead improvement projects with the support of the PI mentor. Certification is then done once the training is conducted, exam passed and a project signed off by business. All permanent staff is eligible for training on a self-nomination basis. Top performers may also be recommended by business Pitch In enablers.

The WB programme deployed includes a full day interactive training session focused on providing theoretical understanding and a simple user-friendly toolkit to enable the candidate to deliver improvement projects. The training curriculum for the WB session is illustrated in Table 7 .

Table 7: White Belt Training Curriculum

Lean
• Basic Concepts
• History
• Principles
• Lean Tools
  • *Mistake Proofing*
  • *Value Stream Mapping*
  • *Visual Management*
  • *5S*
	3 Hrs

Six Sigma • Measures of Central Tendency and Variation • Concepts of Sigma • DMAIC Methodology	**3 Hrs**
WB Project Certification	**30 Mins**
Test	**30 Mins**

The WB project governance framework is relatively simpler than the one required to be followed for Green and Black belt projects. Figure 28 shows the two toll gates required for White Belt project governance.

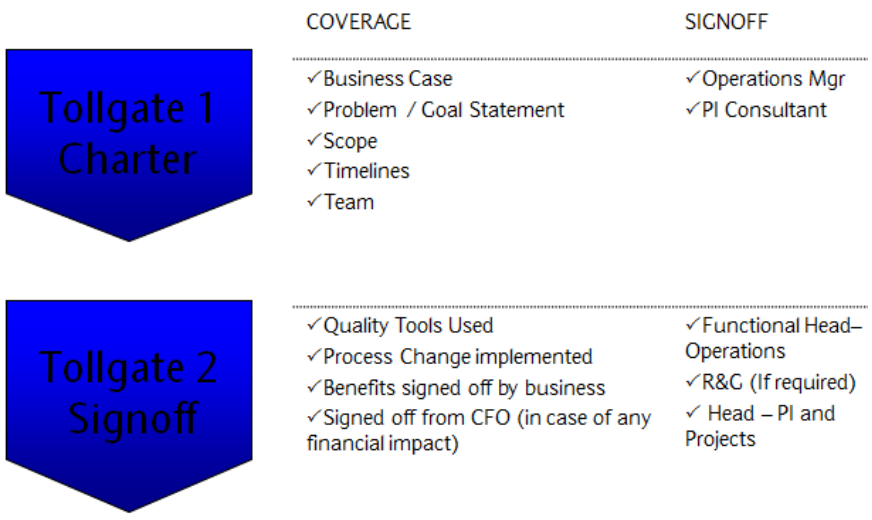


Figure 28: White Belt Project Governance

6.5 PITCH IN PROGRAMME

Pitch In is a Barclays wide tool that is aimed at enabling the realisation of the business' ambition through themed crowdsourcing initiatives. The

business drive is to see Pitch In being utilised as a sustainable business tool for collaborative innovation.

Solutions for the business's strategic objectives are therefore crowd sourced through regular campaigns where colleagues are mobilised and empowered to transform the enterprise by submitting their idea aimed at reaching a solution for the set challenge. Ideas are mined and refined within an idea council and, depending on complexity, assigned to white belt, green belt or black belt for execution. Figure 29 shows the focus theme areas for the Pitch In campaigns.

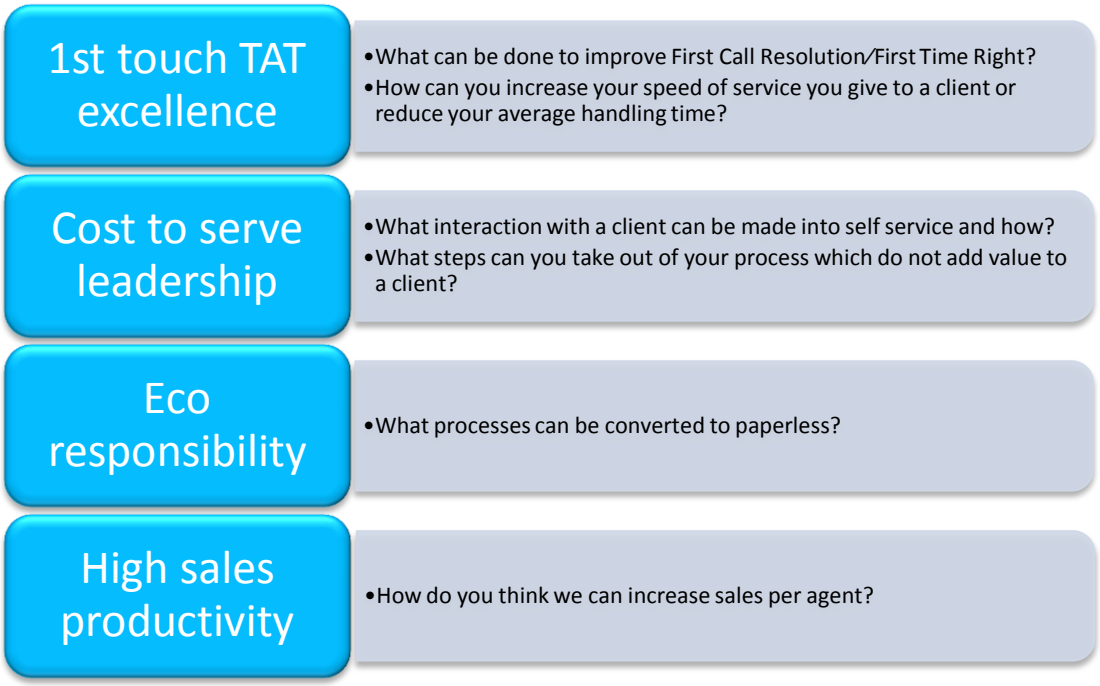


Figure 29: Themed Pitch In Campaign Focus

Pitch In Idea Councils are held to mine and refine ideas receive, discuss and resolve issues, and assign finalised ideas. The meetings are held biweekly, led by the BU Pitch In Champion and attended by the Portfolio Manager and

Business Lead as the quorum. The roles and responsibilities of the council members are listed below:

- BU Champ
    1. Set up agenda
    2. Lead discussion
    3. Maintain minutes
    4. Gather and present Ideas
    5. Mine and refine ideas in conjunction with PM and management
    6. follow up on previously assigned ideas
- Portfolio Manager
    1. Advise on idea assignment to green belt and Black belt
    2. Assist in feasibility assessment of ideas
- BU Management
    1. Take action towards outstanding issues
    2. Support refining of ideas towards BU's needs

CHAPTER 7

CASE STUDY ONE: OPTIMIZE HOME LOAN DECISION TAT

7.1 INTRODUCTION

The Home Loans Processing business unit at Absa made a conscious commitment to developing and driving the benefits of Six Sigma within the organisation. This commitment was evidenced by one of their first White Belt projects having delivered real benefits to the business.

Below is a broad outline of a Black Belt level project conducted with the view of optimising the home loans approval in principle (AIP) turnaround time. For this case study the author strictly conducted a post project evaluation and statistical analysis of the work done by the designated project Black Belt. This was done with a view of highlighting the most rigorous case study that would efficiently test and illustrate the efficacy of the applied project methodology.

7.2 DEFINE

7.2.1 Business Case

The Bank's average performance on 4 out of the 6 key process metrics used for evaluating the performance of home loan and conservative lending approach had resulted in a change in relative competitor positioning to 3rd place for new bonds registered. An opportunity was identified to improve the overall home loan value chain in terms of eliminating the non-valued steps and checks so as to improve the TAT of home loan disbursement.

Competitors were shown to provide customers an "approve in principle" decision (AIP) within a shorter timeframe (24 hours) than what Absa did. As at the July 2012 the bank provided AIP within 3 to 4 working days (for fit for processing applications). This potentially resulted in loss of creditworthy customers (existing and potential). The application processing application used (System A) proved not to be acting as an appropriate filter and could result in unnecessary rework as declined applications were sent back for processing from channels.

7.2.2 Problem Statement

The bank only provided customers an "AIP/NO" decision within 3 to 4 working days, whereas competitors provide a similar decision within a shorter timeframe (i.e. 24 hours). The process has multiple decision points resulting in conflicting information reaching the customer.

7.2.3 Goal Statement

To reduce the "AIP/NO" decision TAT (for approx. 85% of total applications) from 3-4 working days to 1 working day (or less) for In scope applications by December 2012.

Primary metrics for the project were:

- TAT of Scored applications[2]
- TAT of Non Scored applications – Manual applications
- Overall TAT (AIP)

The scope of the project was defined as follows:

In Scope

- Scored applications: Accept, Decline, Credit Refer applications
- Non Scored apps: 682 applications

Out of Scope

- Other application decisions (outcome of System A)

7.2.4 Project Organisation

The purpose of the project organisation is to define and establish the projects structure of accountabilities and responsibilities. There are three main project interests, as shown in Figure 30 (Murray, 2002), and each member of the project organisation falls in at most one of these categories.

[2] Outcome of System A - based on volumes

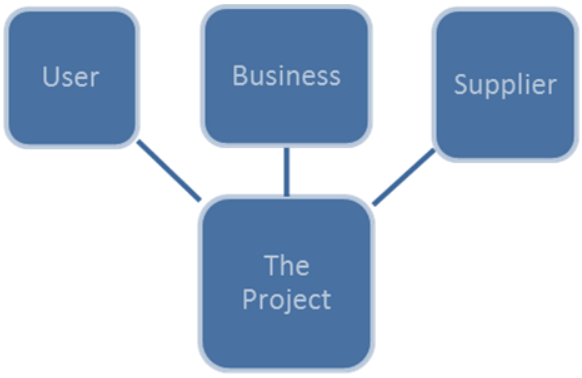


Figure 30: The Three Project Interests

The home loans TAT project organisation is shown in Table 8

Table 8: Project Organisation

Role	Responsible
Project Sponsor	CEO
Project Champion	Head – Performance Improvement and Projects
Process Owner	Head: Channel performance and Enablement, head: home Loan processing
Project Mentor	Sr. Consultant (MBB)
Black Belt/Project Leader	GBT Consultant
Team Members	Manager-Team C, Consultants: Business Efficiency (HL), Manager-Team A, TL - Team A, Manager – Product Centre., National Manager - Credit Team, Manager – Team B

7.3 MEASURE

7.3.1 Project COPIS view

The high level COPIS view shown in Figure 31 was developed to represent a home loan application life cycle from initiation until the customer got an AIP response. This view shows the relationship between the voice of the business, process, employees and, more importantly, of the customer. This is a precise view of the job to be done to produce the desire outcome around the defined expectations. Applications originate from Middle Office (MO), electronic applications (EA) and Private Bank (PB).

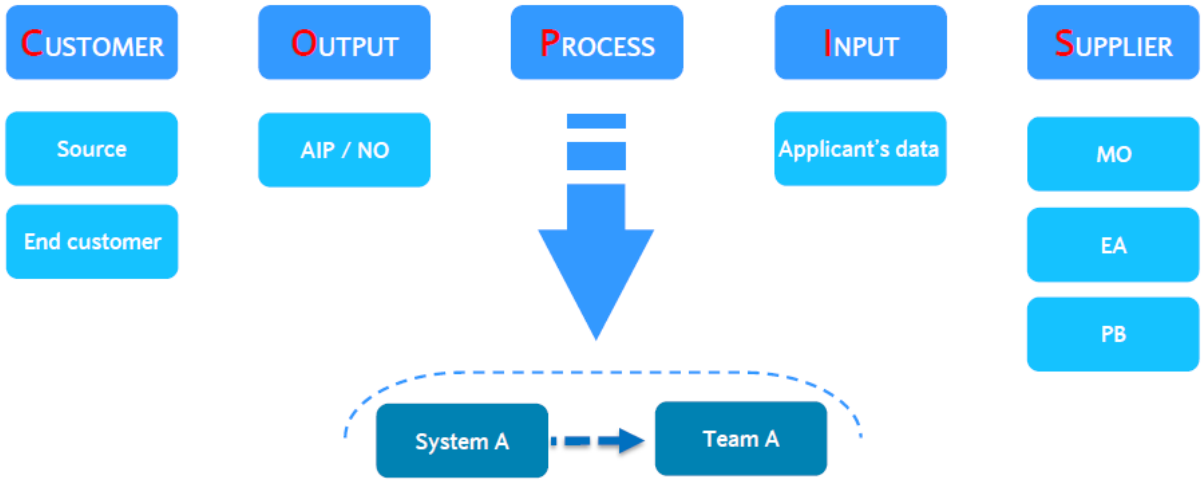


Figure 31: Home Loans TAT Project COPIS

7.3.2 Project Baseline

A baseline study of the chosen project metric, TAT (in number of days) from the point of application initiation until customer received AIP, was done on the "As-Is" state. The base line is indicated in Figure 32 .

After base lining a detailed analysis of each process and sub process in the value stream was conducted and a VSM produced as illustrated in Figure 33. The process study was done in a "workshop" format where all process leads and other key team members working in the process were engaged. The study was done to understand the process of working on an application up until the outcome of System - A which based the scoring on an applicant's credit rating. Once the overall process steps were studied, further detailed process flow maps were developed to aid in the analysis and visualisation of actual gaps in the Home Loans application process flow.

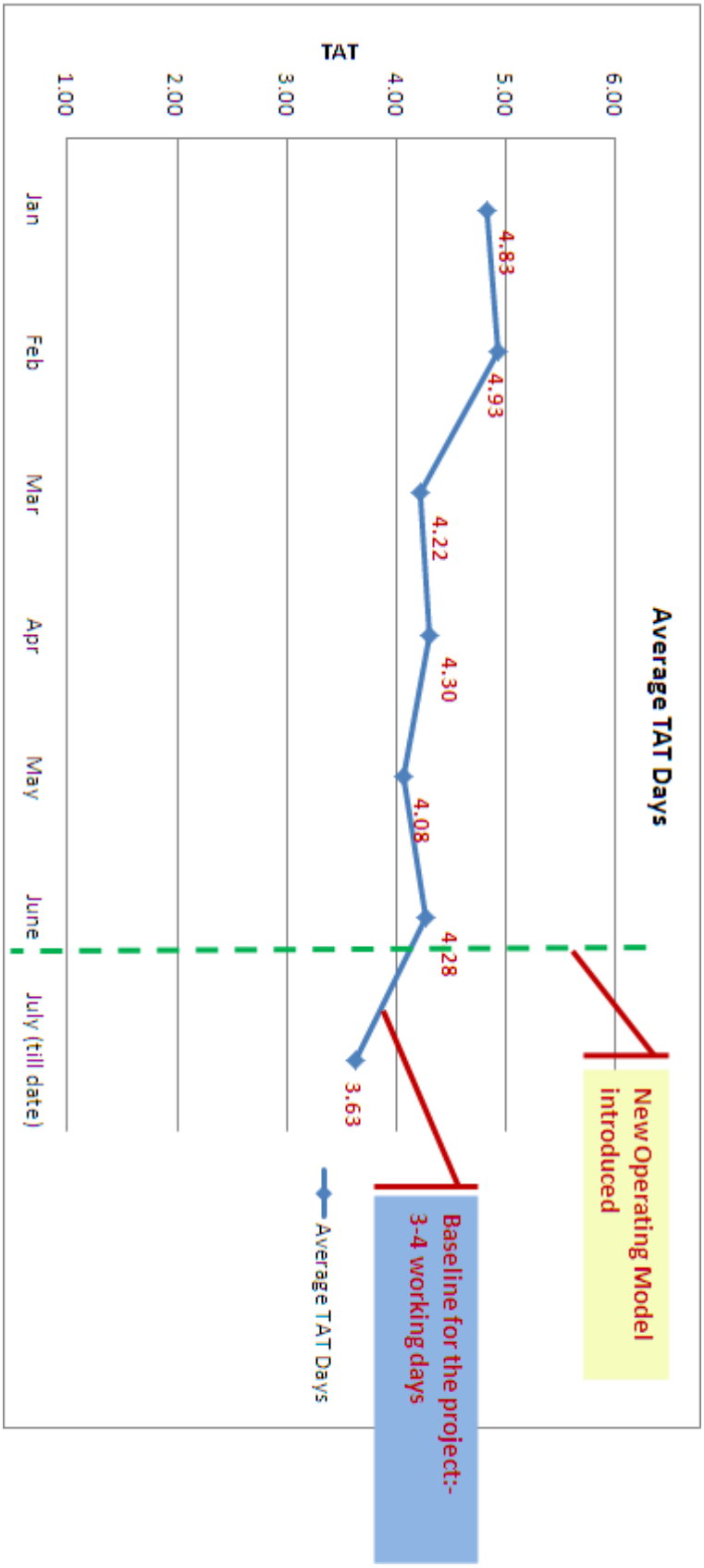


Figure 32: Home Loans TAT Project Baseline

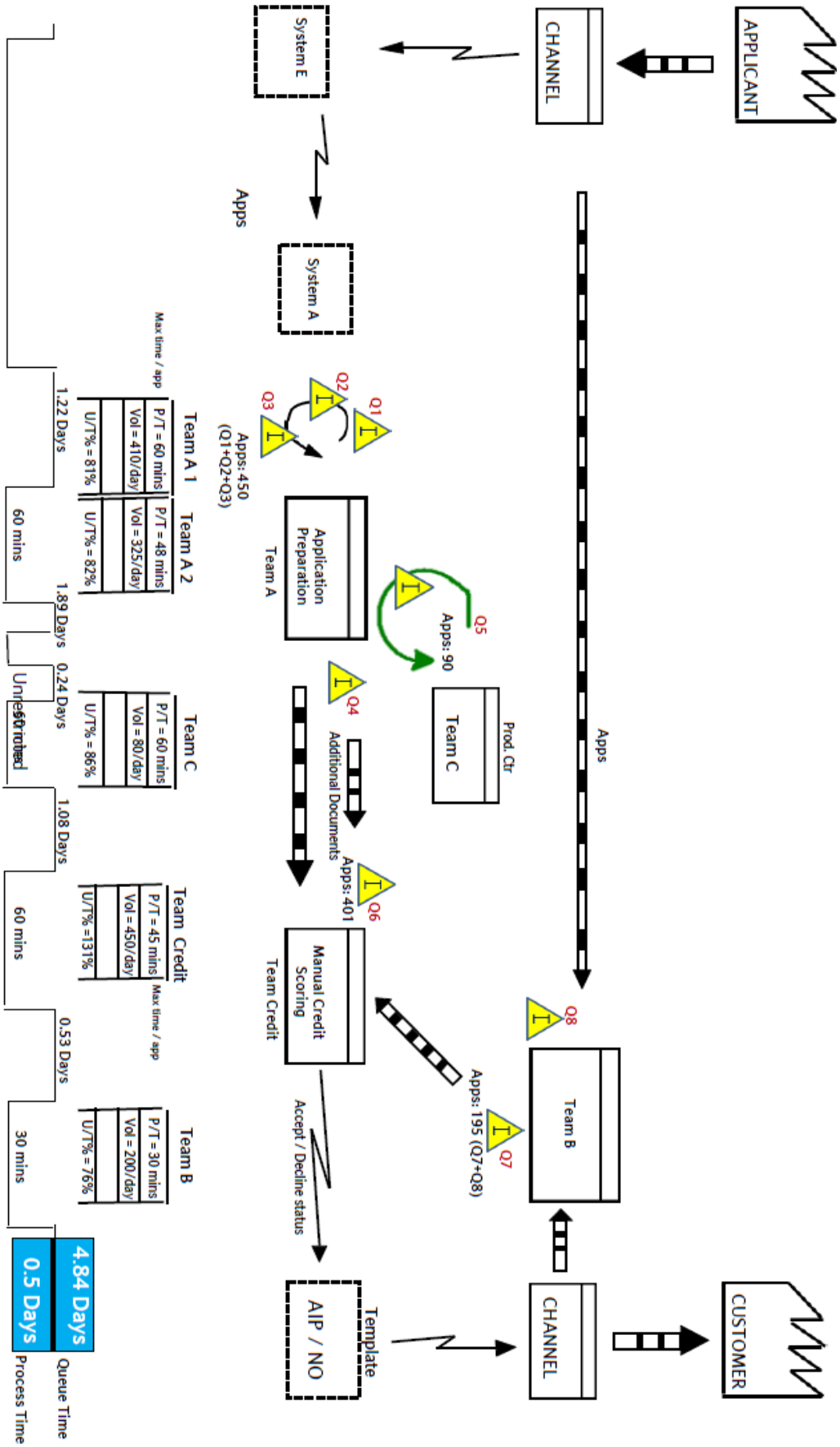


Figure 33: Home Loan AIP "As-Is" VSM

The percentage of AIPs issued per number of days was another important metric used in the base lining and expected benefits visualisation. This metric is shown in Figure 34 .

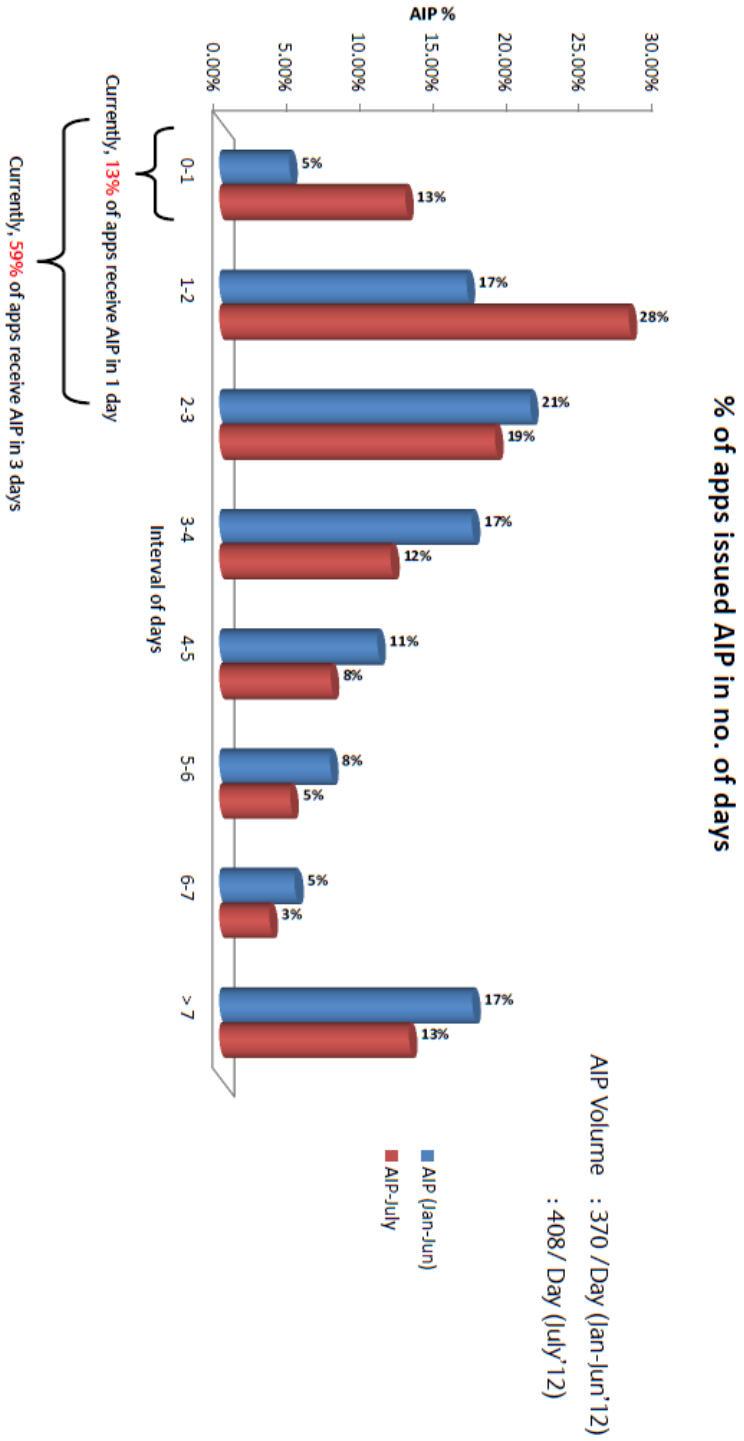


Figure 34: Proportion of Applications Issued AIP in x Number of Days

The percentage of various decisions post application process, as submitted to the System - A which screens the application basis certain credit rules, are also shown in Table 9 .

Table 9: Outcome of System A as per Risk Grading

Initial System Decision	No. of Applications	%	Risk Grade						
			0	1	2	3	4	5	No TRG
Accept (A)	121	13.06%	39.43%	14.85%	19.38%	23.91%	2.42%	0.00%	0.00%
Decline (D)	326	35.18%	40.92%	6.39%	13.42%	16.89%	9.29%	13.09%	0.00%
Fraud Refer (F)	51	5.51%	63.41%	8.36%	12.65%	10.83%	2.30%	2.45%	0.00%
Incomplete (N)	4	0.44%	39.74%	15.58%	17.66%	13.25%	5.45%	8.31%	0.00%
No Initial Decision	80	8.67%	2.46%	0.93%	1.45%	1.09%	0.15%	0.11%	93.82%
Policy Decline (P)	6	0.67%	23.08%	4.79%	18.97%	26.32%	11.28%	15.56%	0.00%
Credit Refer (R)	303	32.69%	35.79%	21.42%	27.31%	15.04%	0.44%	0.00%	0.00%
Sales refer (V)	35	3.78%	58.62%	7.72%	15.77%	15.86%	2.04%	0.00%	0.00%

7.4 ANALYSE

A Pareto analysis of the system outcome is shown in Figure 35 for the January to May 2012 period.

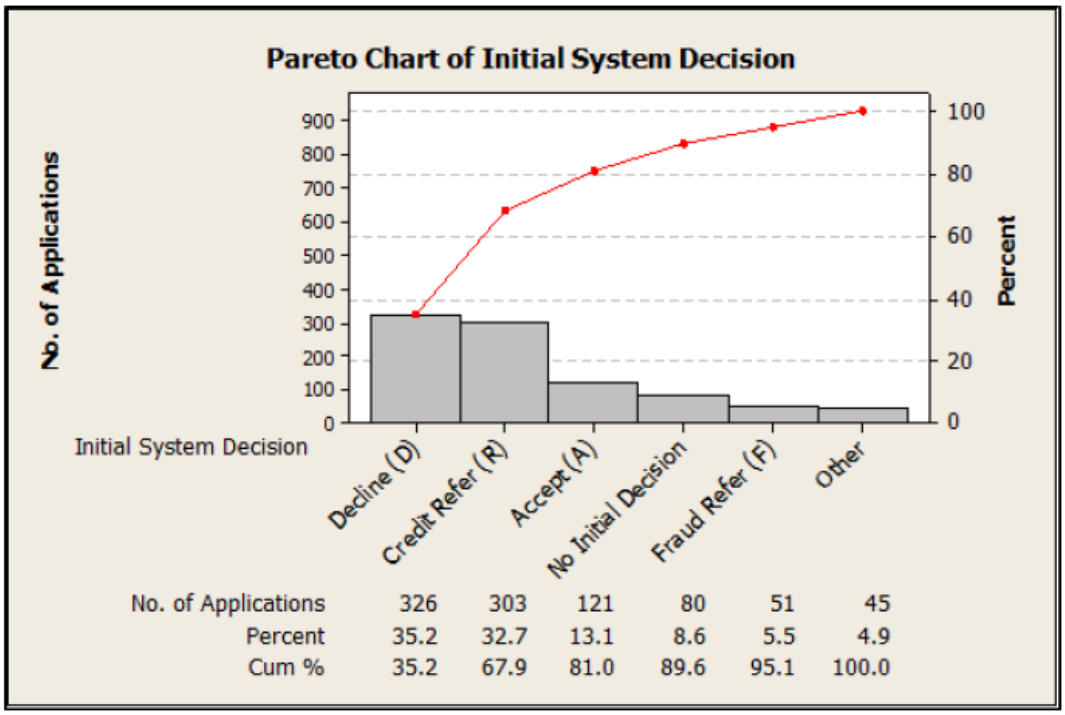


Figure 35: Pareto Analysis of Initial System Outcome

The analysis indicated that Decline, Credit Refer, Accept decisions cumulated to 80.93% of the total volumes. Further analysis of the contribution by risk grade found that risk grade 0, 1, 2, and 3 contribute an average of 90% of the 80.93% volume.

The matrix shown in Table 11 indicates the touch points of an application as per system outcome in the "As-Is" value stream. This view clearly indicates that almost all decisions follow the same steps in the overall process hence, any improvement done on Accept, Decline and Credit Refers would be implicitly replicated on the other decisions thus covering the entire scope of the Home Loans application business.

A Minitab calculation of the Sigma level of the "As-Is" process, with a defect being an AIP in longer than a day, yield being all AIP produced in a day or less and opportunities being the AIP volumes, is shown in Table 10.

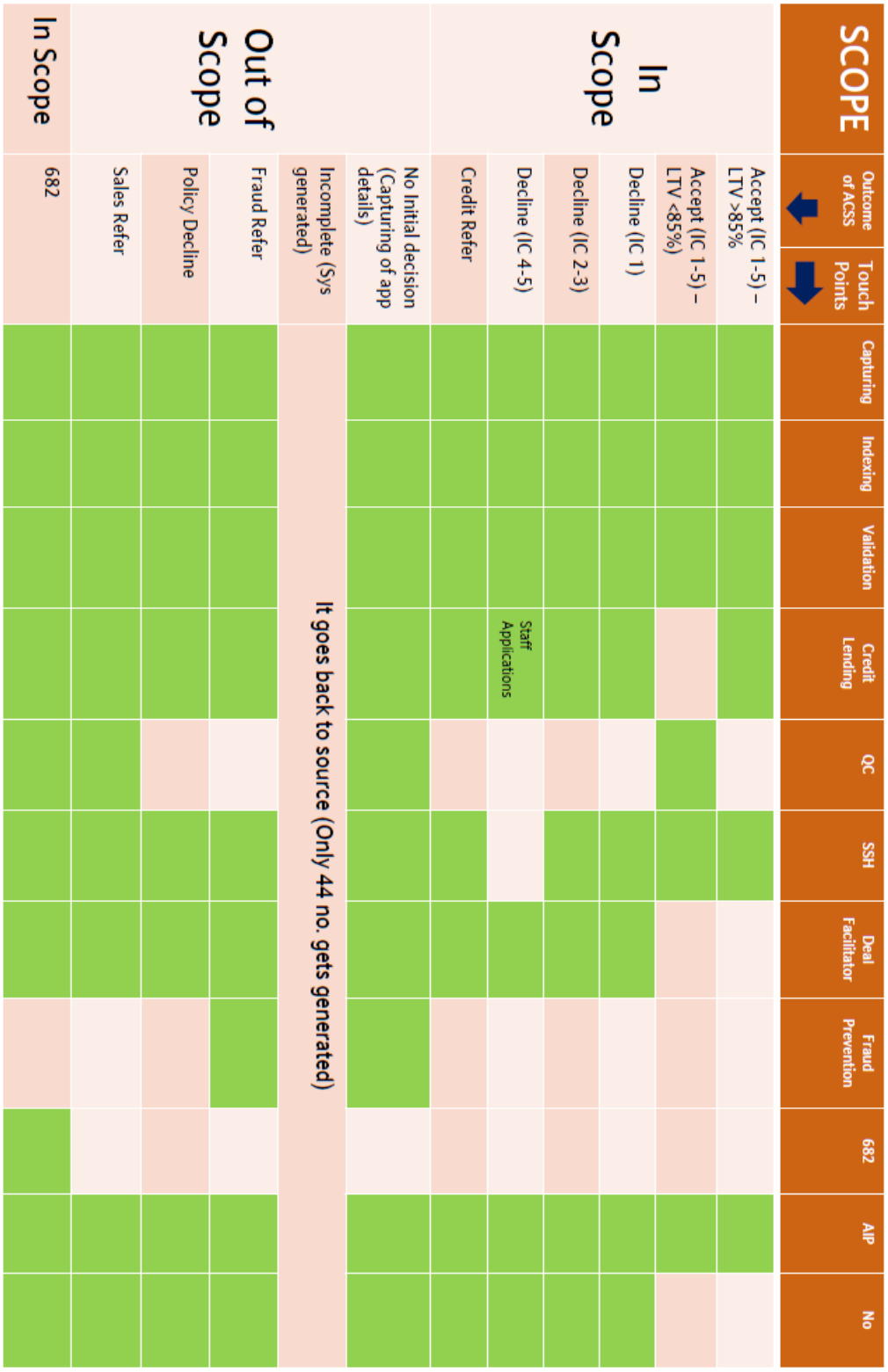
Together these analyses highlighted the major focus areas for the process improvement initiative as shown in Figure 36.

Table 10: AIP Sigma Level

July'12

Parameter	Value
Opportunities	8164
Yield	1061
Defects	7103
Process Sigma	0.37
Defects%	87%
Yield%	13%

Table 11: Process Touch Points per System Outcome



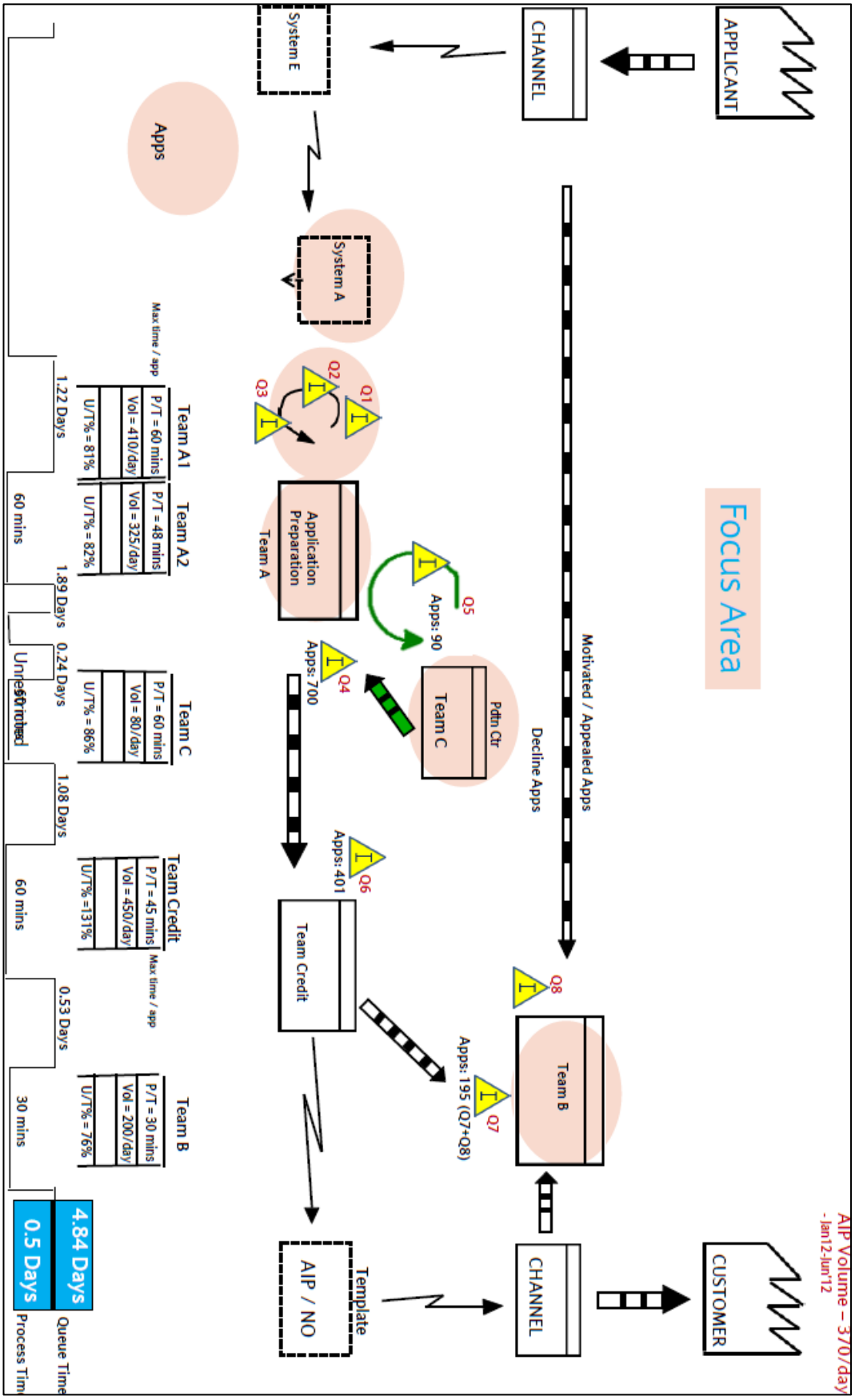


Figure 36: Focus Areas - AIP/NO Home Loan Process "As-Is" State

7.5 IMPROVE

The Control Impact Matrix for the opportunities identified is also shown in Figure 37. A project team brainstorming session was done to prioritise the identified opportunities; the ones selected for implementation are circled in the same figure. The signed off and implemented steps to improve the overall process are shown in Figure 38 for which the overall implementation plan had a November 2012 completion target.

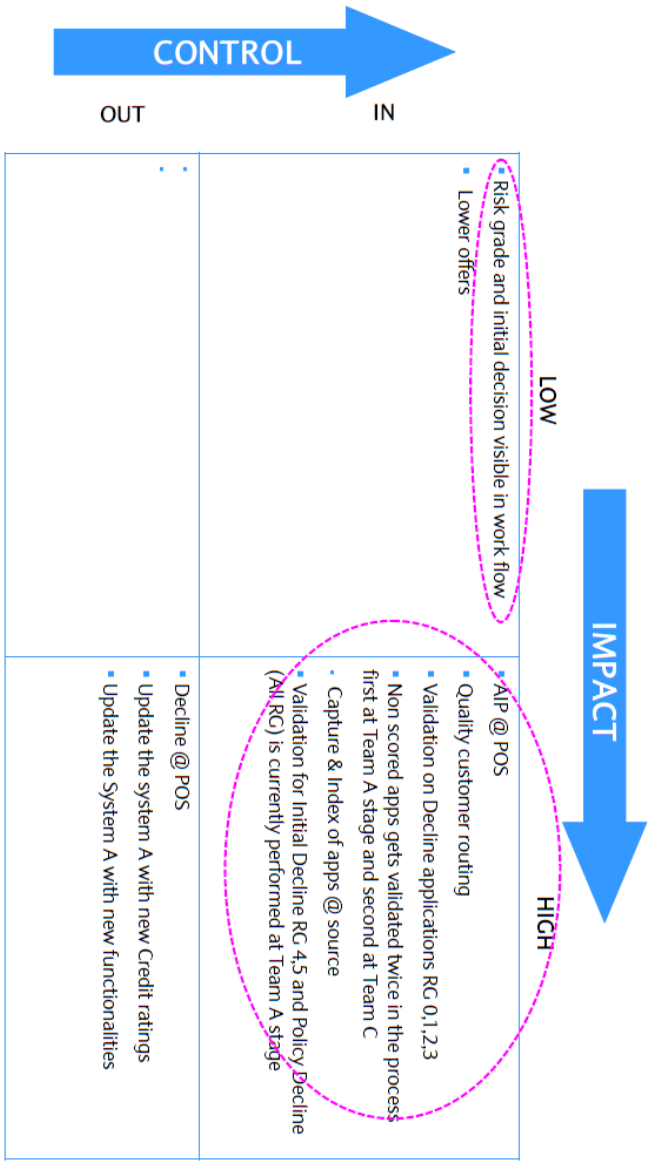


Figure 37: Control - Impact Matrix for AIP/No Home Loan Process

S.no.	Gaps Identified / Opportunity	Description	Benefit: TAT/FTE/Exposure on apps
1	AIP @ POS	AIP template issued to Accept RC (1,2)	TAT: less than 1 day for 25% applications (outcome of ACSS)
2	Work prioritization	a.) Quality customer routing b.) Risk grade and initial decision visible in work flow (System D)	
3	Validation for Initial Decline RC 4,5 and Policy Decline (All RC) is currently performed at Team A stage	To stop the validation activity for Decline applications RC 4,5 and Policy decline applications (All Risk Grade)	6 FTE (5+1) TAT: 0.2 day Exposure: 5%
4	Validation on Decline applications route to Team B - RC 0,1,2,3	To consolidate Validation and checking merit step at Team B	22 FTE TAT: 0.2 day Exposure: 6%
5	Capture & Index of apps @ source	Team A- Capturing + Indexing @ Source: (EA + MO)	a.) 6 FTE (5+1) TAT: 0.4 day Exposure: 12%
6	Non scored apps gets validated twice in the process first at Team A stage and second at team C	Non Scored applications to be validated at Team A stage as same process followed for scored application	4 FTE TAT: 0.5 Day Exposure: 10% of total volume

Figure 38: Opportunity Description and Benefits

7.5.1 Focus: AIP at Point Of Sale and Work Prioritisation

The first implementation focus for the process improvement was on prioritising "quality customers" and to reflect the Scoring Decision and Risk grade in the system.

One of the core principles used in the development of the Home Loans operating model is the prioritization of "quality customers"; that is those with good risk profiles and adequate affordability. The system applied a

FIFO approach and the processing agents could not view the scoring outcome or the applicant's Risk Grade on the system screen. Agents therefore had to use other system enquiries to obtain these details. This operating procedure impacted the TAT for the decision to be delivered to the customer. A change was therefore required to be made to the system queues to enable the prioritisation of the best quality applications and also enable the agents to view the decision outcome and risk grading.

Applications were therefore to be auto prioritized in the system list so that applications with risk grade 1 and 2 should come on top. Applications with risk 0, 3, 4 and 5 would then be listed on a FIFO basis as per usual procedure. System D users were also to be able to view the application initial scoring decision and the applicant's risk grade prior to opening a case.

7.5.2 Focus: Validation for Initial Decline and Policy Decline

The second focus for improving the HL application process was a review of the policy of validating initial declined and policy declined applications. Validation on initial decline applications, for risk grading 4 and 5, was performed before final termination. Validation on policy declined applications was also done for all risk grades.

The recommendation was to do away with validation on the Initial and policy declined applications so at to improve on the decision TAT and contribute to staff prioritisation on quality applications. Benefits analysis of the recommendation was conducted and results were as summarised in Table 12 .

Table 12: Benefit Analysis for Validation

Opportunity	Impact (man hours)	Impact (TAT)	Exposure on Apps
a + b	+- 50 hrs. (6 FTE's)	0.4 day	11%

A pilot run for the proposed operating procedure was commissioned and run over two weeks in one of the banking regions. The measurement of performance was based on the metrics shown in Table 13 and a summary of the pilot run is illustrated in Table 14.

Table 13: Pilot Run Performance Measures

Measure	Report Type
No. of cases routed to Deal Facilitator	System D – Data Dump
Conversion Ratio	System D – Data Dump
Rework ratio	System D – Data Dump
Time / application	Time and motion study
Overall TAT	TAT – Data Dump

Table 14: Summary of Pilot Run 1

SUMMARY OF PILOT RUN
• Pilot Run Timelines: 2 Weeks - 26th November'12 to 7th December'12 • Team Involved: Region A- Team A and Team B • Staff involvement: All resources (Region A) • Total applications processed: 442 • Total application (decision) changed to Accept: 2% • Total applications referred to Credit: 9% • Total applications remained Declined: 88% • Time study on applications(Sample): ~15%

The results of the pilot study indicated the following:

- Increase in productivity which created capacity to handle up to 17% extra applications daily;
- Reduced TAT for the scored applications by 0.6 days;
- Improvement in time per application: 69%;
- Quicker processing overall - 45 min⁄app saved;
    - pre pilot : 65 min⁄app (35 min – Team A + 30 min –Team B);
    - post pilot : Average handling time : 20 min⁄app (Team B stage);
- Freed up effort = 19 FTE (Team A stage);
- Freed up effort = 3 FTE (Team B stage);

The cumulative of the above results would ultimately reduce TAT and release capacity to handle quality applications in one step. Recommendations stemming from the pilot results and further work observations were therefore:

1. To include the system B in the processing of applications in Team A & Team B teams to have 360 degree view on Lean enquiry
    - Time save: ~10 min / application
2. To have "Typing Tutor" Software on the each system, so that resources can practice typing and can enhance their typing speed.
    - Time save: ~2 min / application
3. In order to reduce the appealed ⁄motivation cases there is a need to modify decline template and to include outcome as "Declined by Team X" in the system.

4. Stop forwarding declined risk grade 0 apps as there is no merit (88% remained declined)

7.5.3 Focus: Capturing and Indexing at Source

The capturing and Indexing of all HL applications was done by Team A. Of the total applications indexed and captured on a daily basis, 80% was contributed by an internal source (Express agents); the remaining 20% being contributed by external sources (Mortgage Originator). The objectives were therefore to reduce TAT for the scored applications and also to process quality applications faster. The expected benefits were a reduction in the TAT for the scored applications by 0.4 days. The approximately 48 hour saving (+/- 6 FTE) could therefore be utilized in prioritising the processing of quality applications.

The recommendation was therefore that the applications be captured and indexed at source for both internally and externally sources.

7.5.4 Focus: Non Scored Applications

Another improvement opportunity identified was the option to integrate Teams A and C. Team C validate and draw enquiries on non-scored applications and they consist of 13 resources including 2 team leaders. Of the work covered by the "682" team, approximately 60% of the work content was identical to what Team A did for scored applications

The objective of integration was to reduce the TAT for the non-scored applications, remove duplicate checks and reduce multiple handoffs in the

process. A pilot run was also conducted as summarised in Table 15 and the results demonstrated the following:

- Improved TAT (from 90 min/app to 40 min/app)
- Eliminated process hand off
- Eliminated queue no. 4 (0.2 Day) in process
- 2.4 FTE saving

The total time spent on processing per application came down to an average of 40 minutes which ultimately reduce Team C TAT which accounted for 10% of total volume. Additional recommendations were the proposed relaxation of requirements for external customers.

Table 15: Summary of Pilot Run 2

SUMMARY OF PILOT RUN
• Pilot Run Timelines: 2 Weeks - 20th August to 31th August • Team Involved: Region A, P Centre and Credit • Staff involvement: 2 individuals from the Team C and 2 from Team A (1 from each) + Credit officers to assess the applications • Total applications processed: 61 • Total applications went to Credit: 54 • Not Fit for processing: 7 • Total approved: 32 • Total Decline by Credit: 18

7.6 CONTROL

The gains realised in the focus areas highlighted in the preceding sections resulted in an improved VSM for the home loans application process as shown in Figure 39.

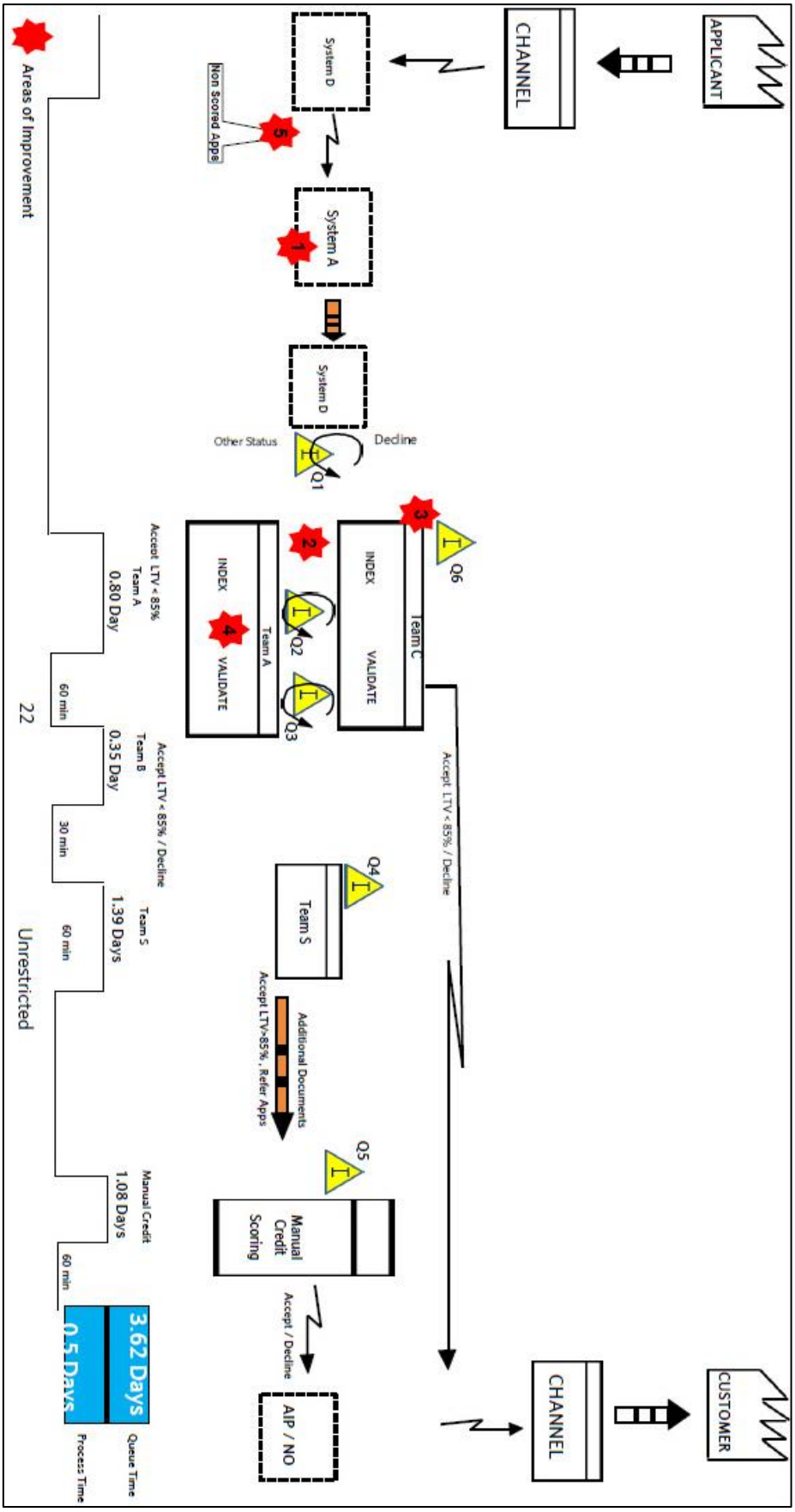


Figure 39: Improved VSM HL Application - Short Term

A long term vision of the process based on capability building and process streamline was developed and is shown in Figure 40. This set up would be where only one system is required for the application which would go through one processing team at the credit department.

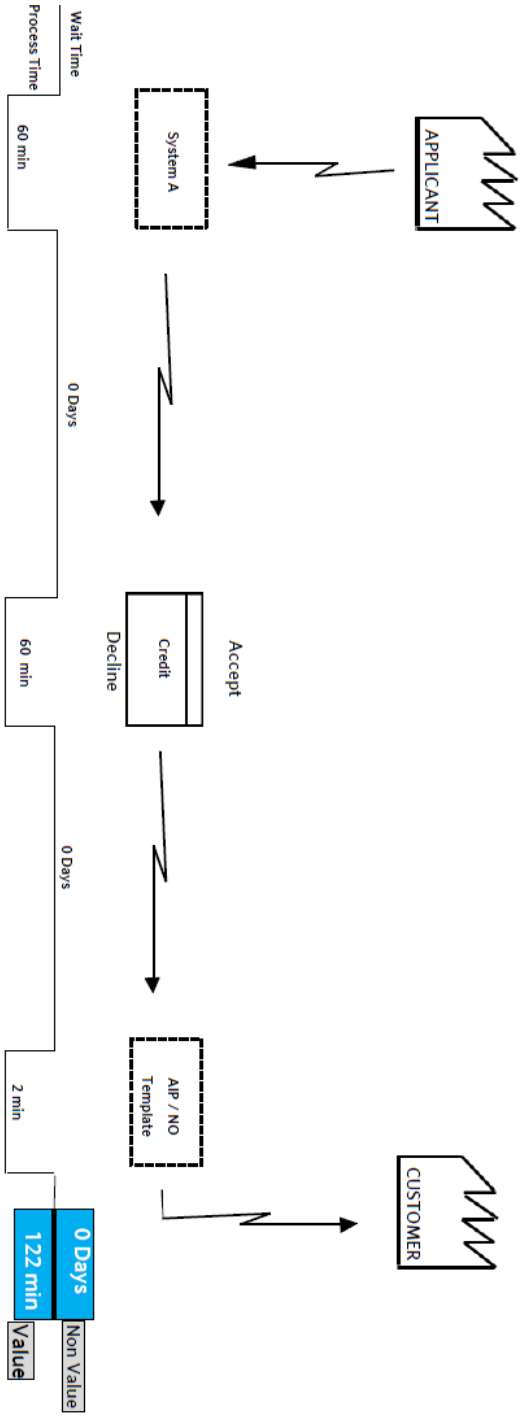


Figure 40: Improved VSM HL Application - Long Term

A statistical summary for the home loans API TAT before the implementation of opportunities is illustrated in Figure 41.

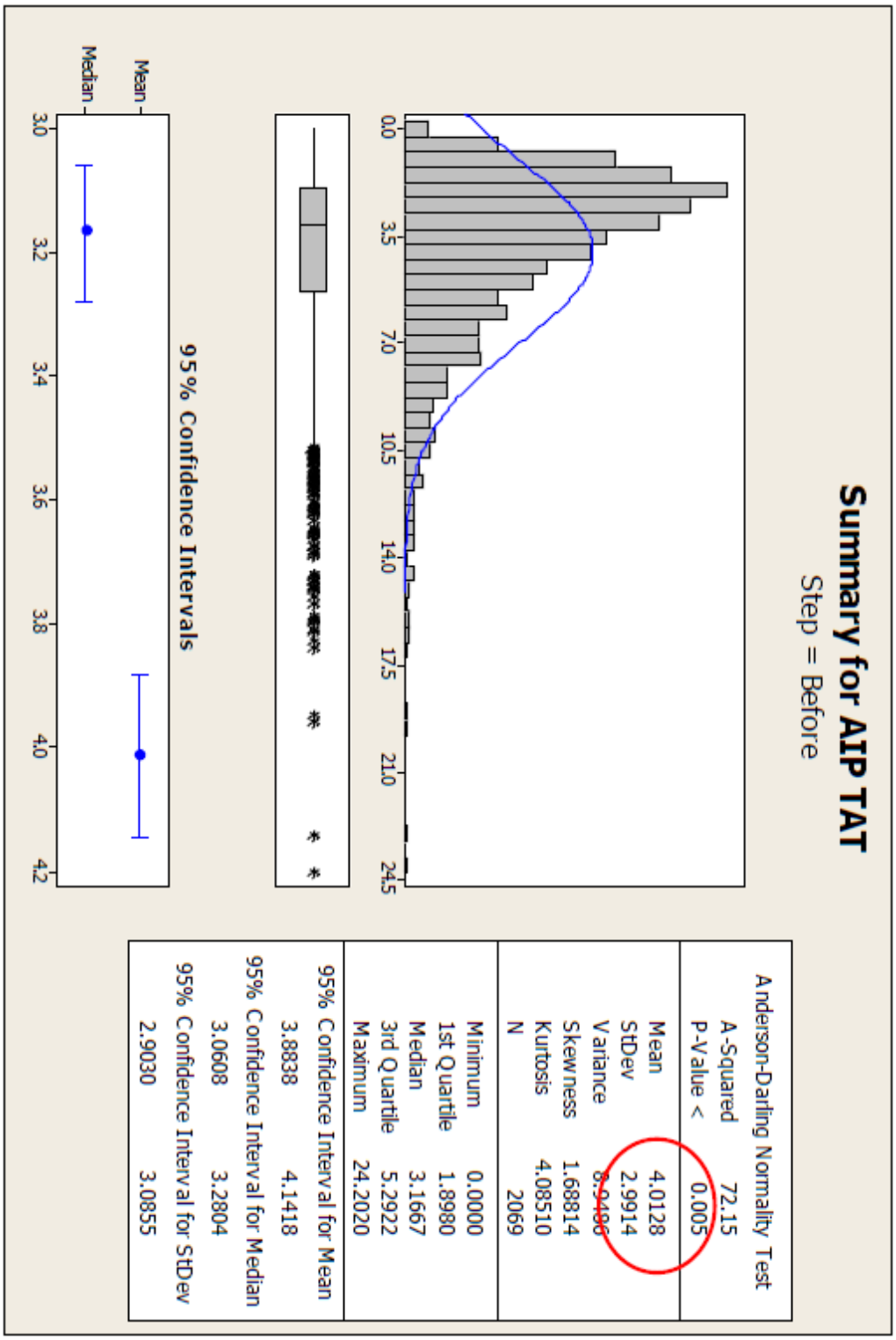


Figure 41: AIP TAT Summary – Before

Similarly a summary for the process after the interventions is shown in Figure 42; this clearly illustrates a downward shift in TAT mean.

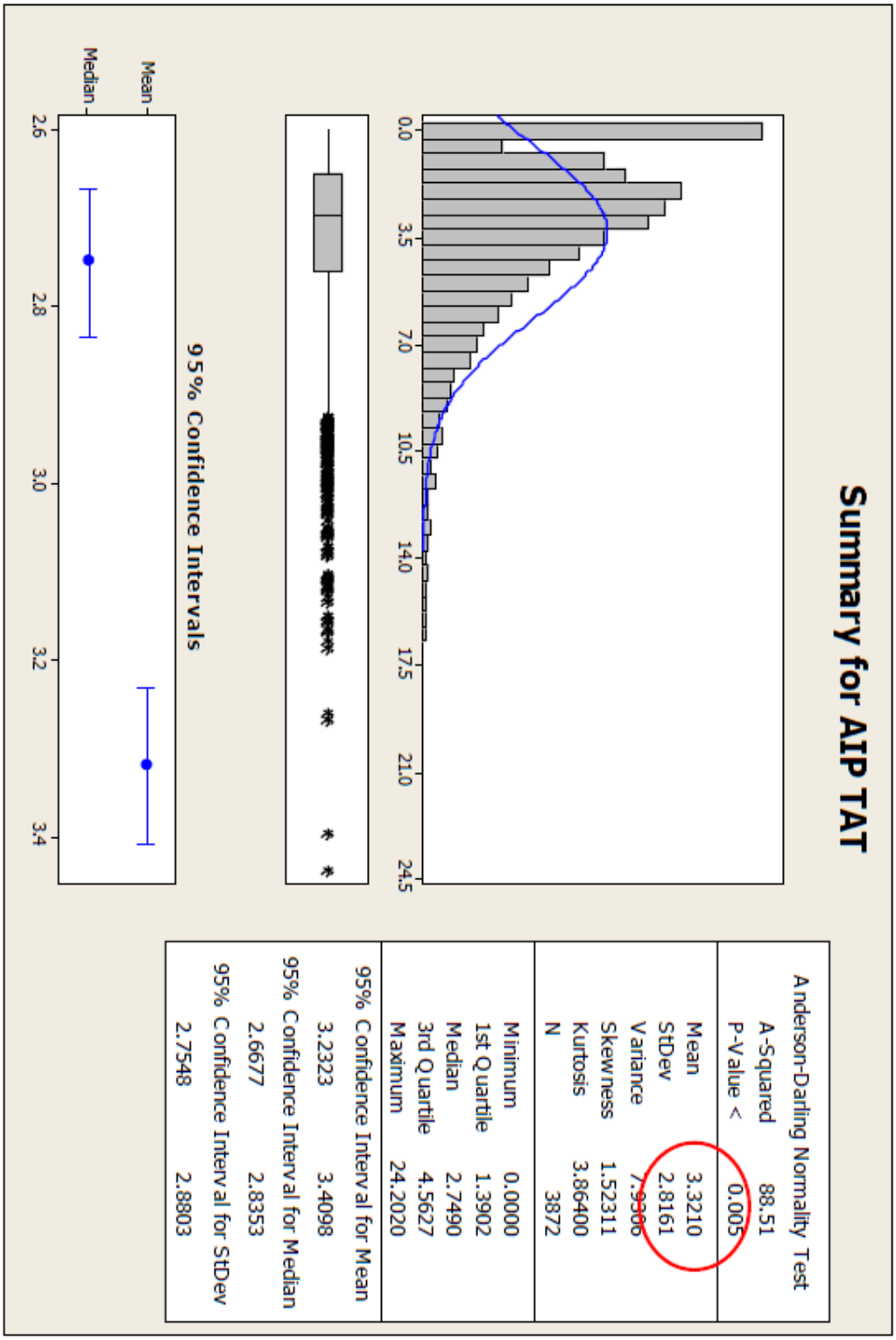


Figure 42: AIP TAT Summary – After

While there may have been an improvement in average TAT the variation remained high due to the dependency on one of the solutions identified, i.e. to change credit functionalities within System A, which was out of control and scope due to time constraint and other strategic issues around the project. This refinement is however a standing recommendation to business and was the basis on which the long term VSM, shown in Figure 40, was prepared.

Figure 43 shows the proportion of applications having a TAT of a day or less on a time series plot indicating the process improvement initiative milestones. Also illustrated in Figure 44 is the improvement trend for the average TAT for the process.

An analysis of 12 months' worth of data with specific focus on the conversion of application volume from approval in principle milestone to registration was also conducted to validate the success of the programme. Results showed that the conversion ratio was increasing month on month, with 33% of AIP volume registering in December 2012. This therefore indicated a greater success of processed applications landing on the books on the back of instituted improvements; Figure 45 and Figure 46 show the improvement in registration conversions post process changes in November 2012.

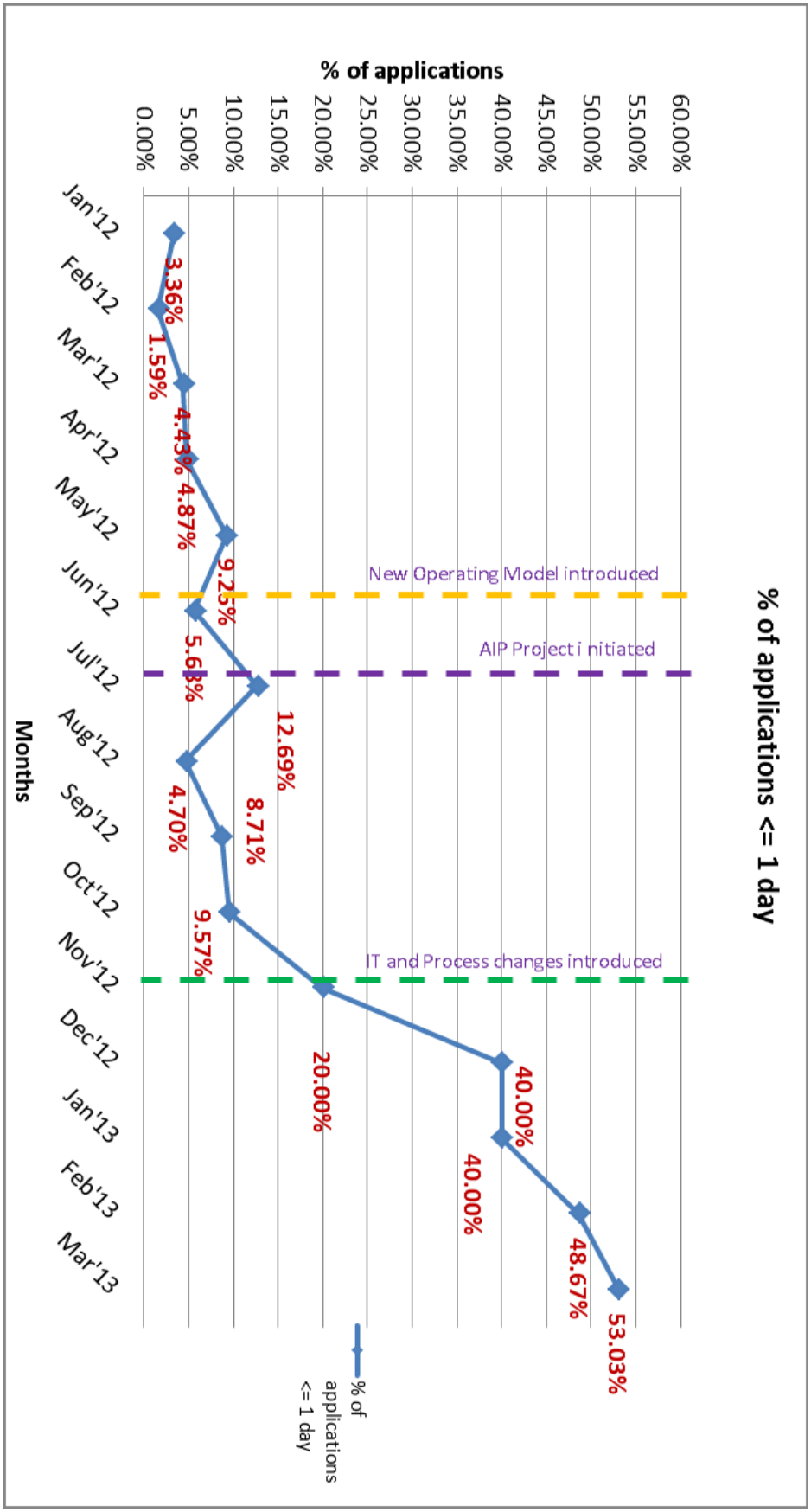


Figure 43: Proportion of Applications with TAT <= 1 Day

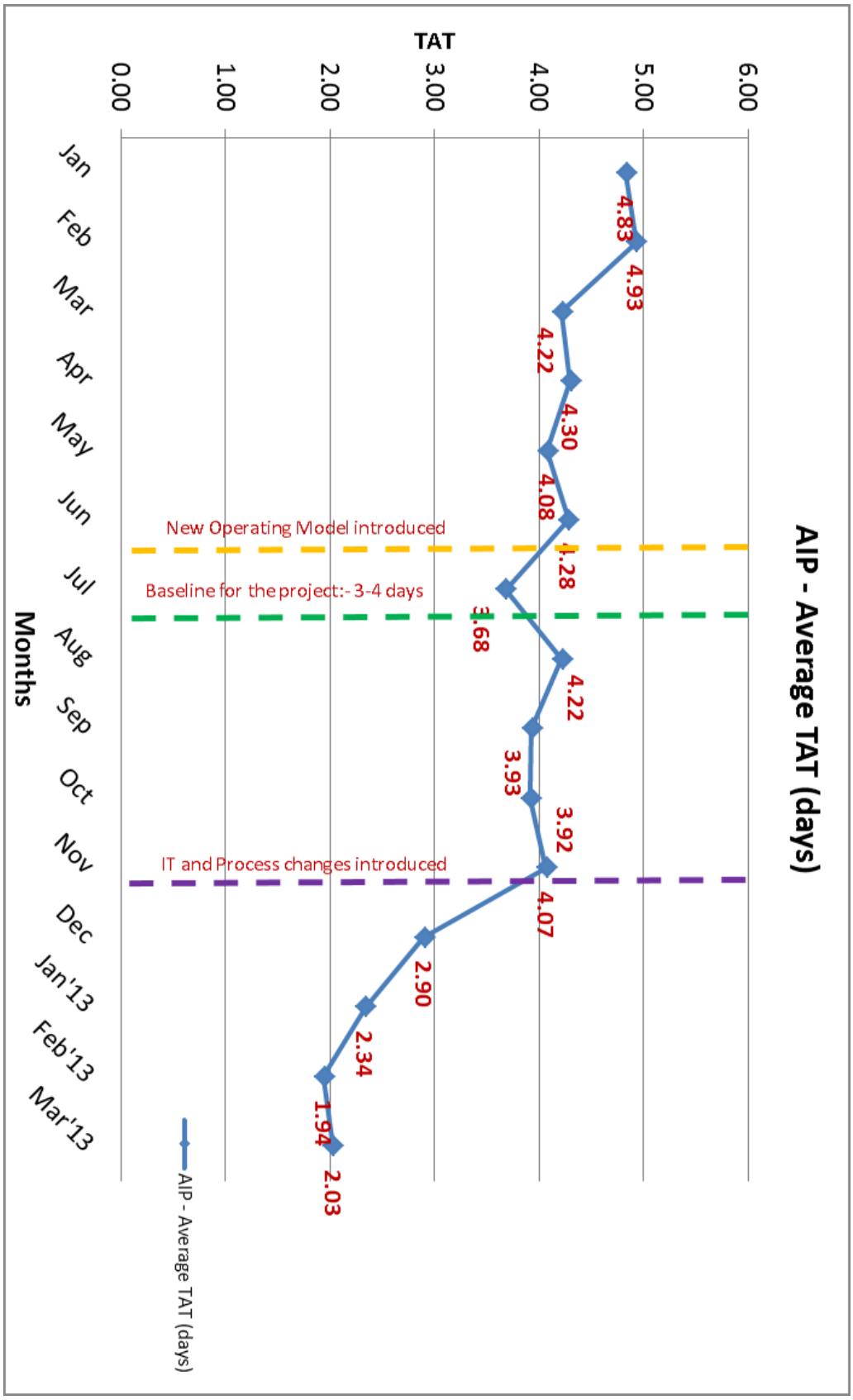


Figure 44: AIP - Average TAT

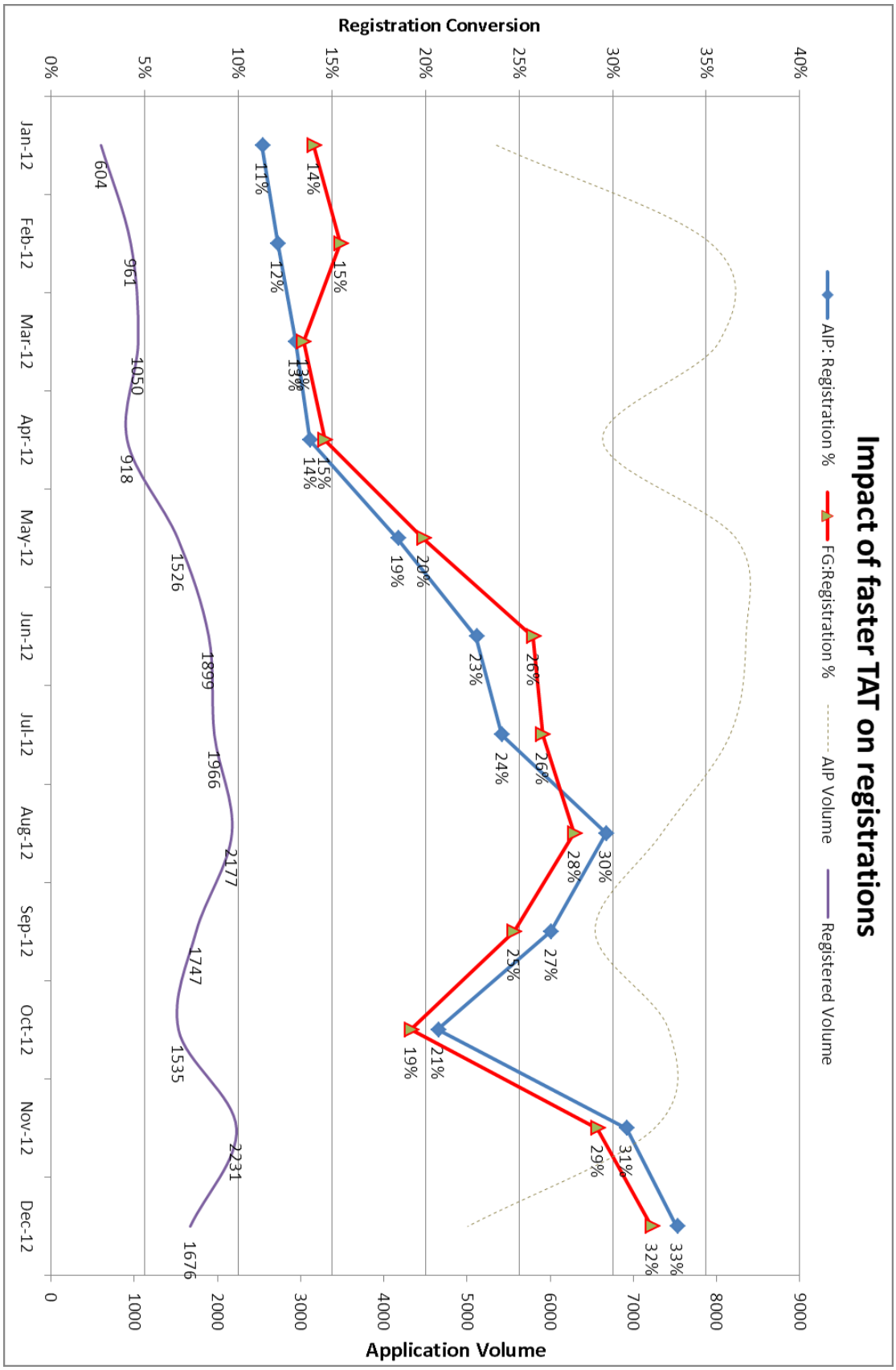


Figure 45: Impact of TAT Improvement on Home Loan Registrations

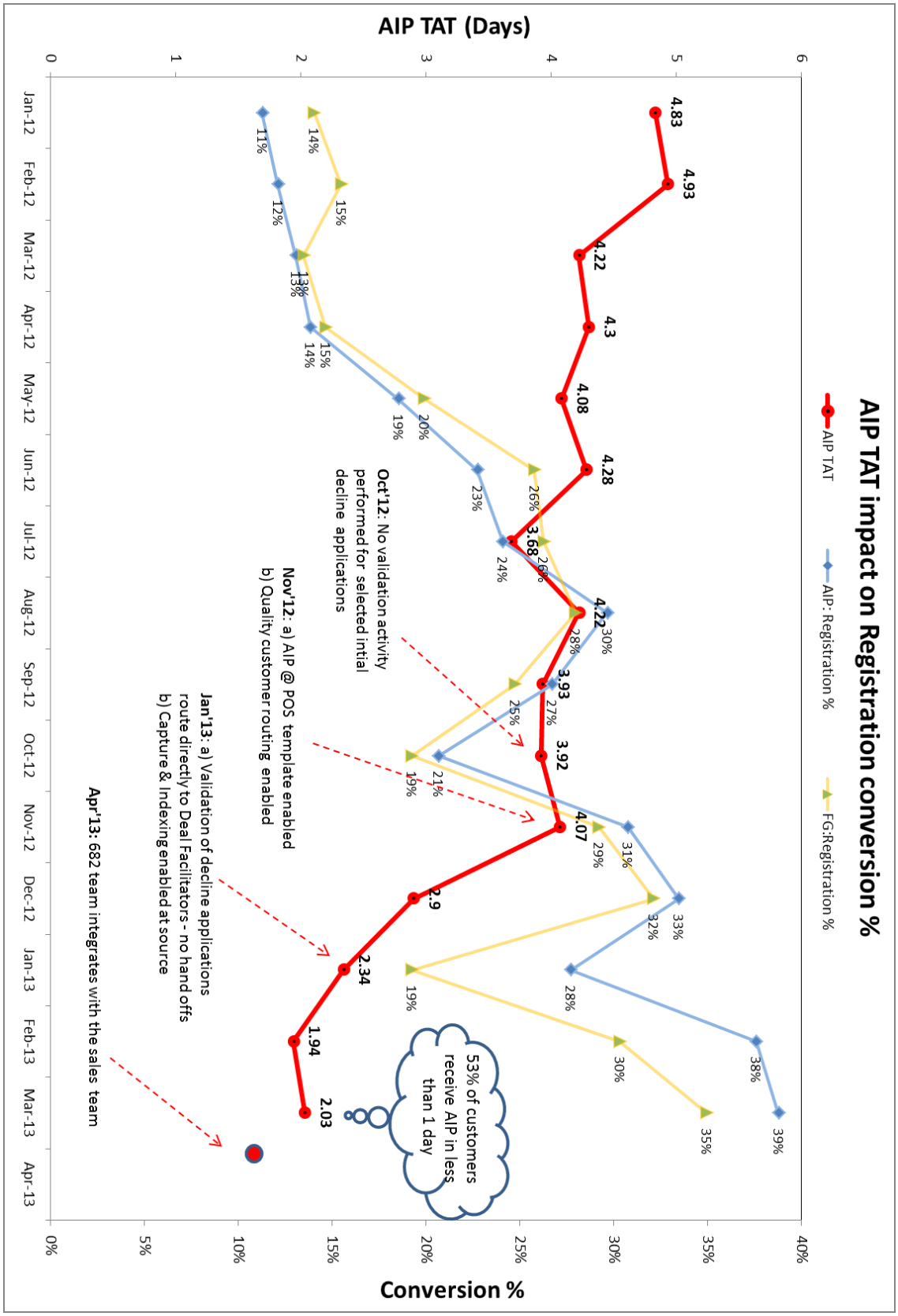


Figure 46: AIP TAT on Registration Conversion Ratio

Process Sigma levels for the before and after state for the Home Loans AIP process are also shown in Table 16. Sigma calculations are on the definitions:

- Defect: AIP >1 day
- Yield: AIP <=1 day
- Opportunities: AIP Volume

Table 16: Process Sigma Calculation

	Before (July'12)	After (Dec'12)
Parameter	**Value**	**Value**
Opportunities	8164	5011
Yield	1061	2004
Defects	7103	3007
Process Sigma	0.37	1.25
Defects%	87%	60.01%
Yield%	13%	39.99%

7.7 CONCLUSION

The Home Loans Processing made a valuable overall contribution to the bottom line of the Home Loans business by reducing costs by up to R32.7 million in the 2012/2013 financial year. This cost saving was achieved on the back of innovations in digitising workflows, reducing unnecessary controls, implementing robust operational disciplines through Active Capacity Management, rigor in managing costs (particularly potential fraud losses) and, most importantly, energetic commitment from each and every employee to do the best for the business. In addition, all audits for the year were rated “Satisfactory” and SLA performance is now consistently sitting at 99%.

CHAPTER 8

CASE STUDY TWO: DFX PROCESS TRANSFORMATION

8.1 INTRODUCTION

For the ensuing case study the author was one of the two designated Project Managers. Contributions of the author towards the work included, but were not limited to;

- Attending programme workshops,
- Project approach tailoring,
- Change management,
- Delivering Lean training to the staff,
- Conducting business process assessments,
- Time studies,
- Data analysis,
- Proposing and initiating implementation of recommendations,
- Project stream tracking,
- Stakeholder management,
- Benefits projection and tracking
- Template design,

- Visual management set up among other tasks.

The DFX Process Transformation project was instituted on the back of various initiatives under the TRANSFORM umbrella aimed at delivering a targeted 15% saving on the cost base for the global DFX Operations space to contribute to an overall target of 49% in the Investment Banking (IB) space by end 2015. The strategic imperative to reduce the cost base therefore translated to a need to reduce the headcount at the Johannesburg DFX Operations office by 12 full time equivalents. These saving were expected to realise at least R3.6M annual cost reduction as from 31 October 2014. This case study covers the work conducted at the Johannesburg DFX Operations office aimed at the realisation of the targeted benefits.

Initial assessments identified the lack of a best practice management system as the major gap and as such the implementation of a Lean Management System across the global locations, including Johannesburg, was the main focus for the project. Various Lean tools and techniques, namely; KPI Tracking, Capacity Management, Visual Management, Daily Huddles, Management Huddles, SOPs, SOP - Process Confirmation, and Skills Matrix/Cross Skilling; were taught and implemented in the team. The major output of the project was the full implementation of a Lean management system. Several other “quick wins” were also identified through value stream assessments and root cause analysis exercises conducted.

One of these quick win initiatives included the update of automated transaction reconciliation rules on the IntelliMATCH platform. This entailed

bulk auto match and auto coding rule update and maintenance plans for all currency groups.

Other work delivered a design to enhance mailbox management activities by mailbox rationalisation, i.e. reducing the number of required mailboxes and redesigning the naming convention. Additional efforts to reduce the capacity expended on managing mailboxes also included the design of auto indexing rules to allow automated workflow of incoming emails. Auto reply messages were also designed to include educational information for customers that would subsequently result in a reduction in unnecessary email volumes.

A plan to remediate the system latency affecting the entire team was also crafted and handed over to business. This plan includes recommendations to conduct a RCA for the latency and also to explore the possible effects of network upgrades and office location.

Data driven decision making was an essential value add as the team realised the benefit of management information in tracking performance and capacity planning as requests for new management reports were submitted for consideration and possible implementation.

8.2 PROJECT OVERVIEW

8.2.1 Problem Statement

There is a strategic imperative to deliver structural cost and business efficiencies by introducing 'Go-To' customer/client and colleague processes, and leveraging Group synergies. The Johannesburg IB Operations team therefore needed to deliver a targeted 15% savings on their current FTE base

by October 2014. Efficiency decline for the particular process group was evidenced by the growth in overall FTE requirements with location migration; 43 head count in SA as compared to the ~30 for the original team in Singapore.

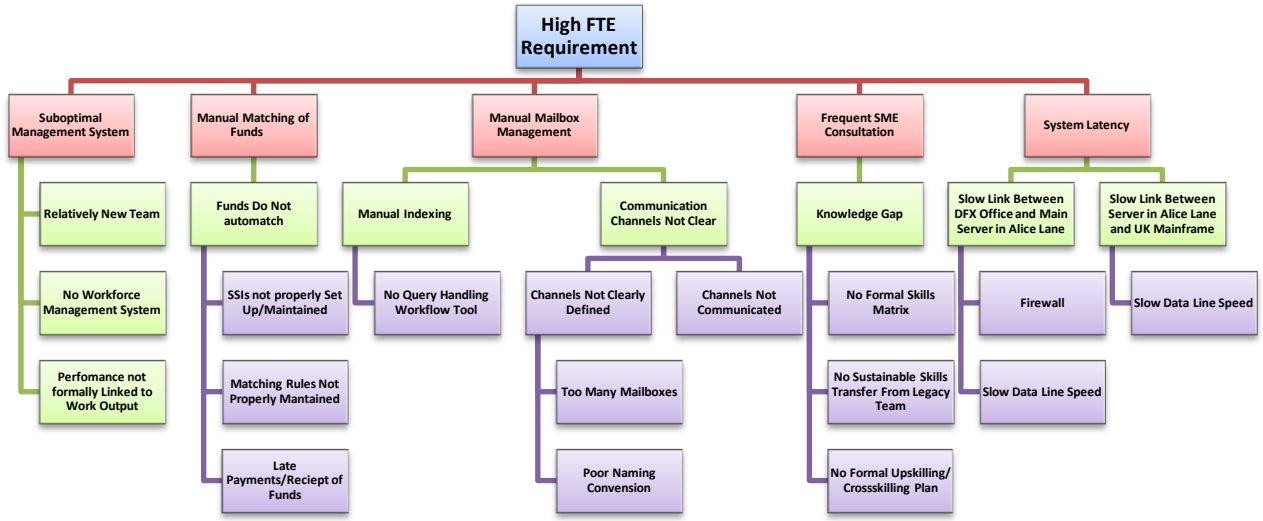


Figure 47: DFX Operations Defect Tree

Figure 47 illustrates the defect tree, as derived from the voice of the customer input, showing the causes that result in the high FTE requirements in the DFX Operations team.

8.2.2 Objective Statement

The goal of this project was to deliver an overall FTE requirement reduction for the Johannesburg DFX Operations Team from 43 to 31 by 31 October 2014. This was to be achieved by transforming the operation through Lean implementation.

8.2.3 Scope

The scope of the overall program extended to the confirmations and settlements functions across the global IB Operations estate. The scope of

this report will however only cover the work conducted by the GBT team in South Africa. References to other locations are made for comparison and clarification of context around particular initiatives. The South African implementation was officially completed by 31 May 2014.

The scope of the implementation was monitored and controlled via an initiative prioritization matrix with any changes needing to go via a change request as stipulated in the project governance framework.

Table 17: Initiation Risk Analysis

Date Raised	Risk & Impact Description	Impact Rating	Probability	Mitigating actions
04-Feb	Risk that identified benefits may be double counted across multiple programmes (e.g. Falcon, Location Strategy & DFX Process Transformation)	H	M	Once benefits have been identified, work closely with various Programme Managers to ensure clear ownership and allocation of benefits
05-Feb	Risk that implementation teams are not able to get sufficient time from business SMEs during the 16 week implementation, due to competing priorities	H	M	Work closely with business SMEs to define time requirements over the 16 week project and begin to schedule time in diaries ahead of next phase
05-Feb	Risk that benefit targets are not clearly communicated to all stakeholders and therefore the overall programme target is not achieved	H	M	Clear communication of targets to all stakeholders and ensure regular monitoring of benefit targets vs actuals
05-Feb	Risk that UK KPMG resources are unable to deliver an end to end implementation due to impact of location strategy moving processes to other overseas locations	M	M	Work with Programme Sponsor to agree where key implementation activities are needed and assess whether there is any impact on budget and timeline

The main constraint for the project was the aggressive timelines in relation to the complexity of solutions proposed. Dependency on IT was the major contributor due to the need for specialised resources and a project independent governance framework. The initial risk analysis for the project is shown in Table 17.

8.2.4 Financial Benefits

The financial benefits expected for the project are summarised below and were calculated on the average annual FTE cost to company of R300 000.

Table 18: Financial Benefits Summary

	Original Forecast	Validated?	Revised Forecast	Validated?	Actual Savings To Date
Date	Feb-14	Feb-14	May-14	May-14	Oct-14
Savings	R 3.0 M	Yes	R 3.6 M	Yes	R 0 M

8.2.5 Non-financial Benefits (Primary and Secondary Metrics)

While a few non-financial benefits where realised through this project only the target related primary benefit of FTE requirement was considered here. Baseline levels for the separate implemented initiatives will be covered in their overview later in this document.

Table 19: Non-Financial Benefits

Primary/Secondary Metric	Baseline	Actual	Goal	% Improvement Toward Goal
FTE Requirement	43	43	31	28%

8.2.6 Other Organizational Benefits

Other benefits expected out of the implementation that cannot be measure or haven't been directly measured as part of the project effort include but are not limited to the following:

- Reduced manual IMatch matching volumes (i.e. improved auto match rate);
- Reduced IMatch recoding volumes (i.e. improved auto coding);
- Reduced capacity expended on mailbox management;
- Improved workflow for queries;
- Improved TAT for queries;
- Improved customer satisfaction (more queries resolved);
- Improved capacity management;
- Improved employee morale;
- Improved visual management systems;
- Enhanced operational transparency.

8.2.7 Summary of Changes Made to Affect Improvement

The overall process transformation project had a view of implementing a Lean management system and quick wins within the 16 week window of the project. The changes made to affect the expected changes include:

- Lean Management System;
  - KPI Tracking
  - Capacity Management
  - Visual Management
  - Daily Huddles
  - Management Huddles
  - Huddle - process Confirmation
  - SOPs
  - SOP - process Confirmation
  - Skills Matrix/Cross Skilling
- IntelliMATCH Rules;
  - Bulk auto match rules update and rules maintenance plan
  - Bulk auto coding rules update and rules maintenance plan
- Mailbox Management;
  - Mailbox Rationalisation – number and naming convention
  - Auto indexing rules
  - Auto reply messages
- Plan to tackle system latency[3].

8.2.8 Timeline

Table 20 shows the planned & actual completion dates of the project's major milestones.

[3] System latency refers to the delay in system response between feeding input and obtaining feedback/confirmation to allow for the next required actions. In this case this is caused by the use of terminal server based technology for all computing and database resources.

Table 20: Project Timeline Summary

DMAIC ☞	Start	Define	Measure	Analyze	Improve	Control
LEAN ☞	Assess and Educate	Plan	Insight	Design	Implement	Monitor
Planned:	15-Feb-14		15-Mar-14	12-Apr-14	17-May-14	31-May-14
Actual:	15-Feb-14		15-Mar-14	12-Apr-14	17-May-14	31-May-14

8.2.9 Team Members

The team members for this project included Management, SMEs and Analysts with the dedicated project management resources coming from the GBT unit of the overall Barclays business. An additional resource for project and methodology oversight and governance was provided by *KPMG UK*. A LSS Master Black Belt was also involved in supporting the author for the purposes of LSS Green Belt certification. Table 21 shows the full team with functional areas and expertise indicated

Presented below are summaries of the phases the project went through as per the DMAIC methodology. The tools applied, conclusions drawn and actions taken/planned are highlighted and linked to respective interpretations pertaining to the major deliverables by phase.

Table 21: Project Team Members

Name	Functional Area	Expertise
Steven Hunter	Head: IB Ops Joburg	IB Ops
Robyn Hawarden	VP: IB Ops Joburg	IB Ops
Roy Campbell	AVP: Confirmations	Confirmations
Tony New	AVP: Settlements	Settlements
Amara Wildhaber	AVP: Investigations	Investigations
Piyush Sharma	BSSA GBT	Process Improvement, BB LSS
Marvel Mandaza	BSSA GBT	Process Improvement
Sara Forbes	KPMG UK	Process Improvement
Grant Baxter	BMGI	MBB - LSS

8.3 DEFINE

8.3.1 Introduction

In September 2012 Barclays migrated their FX Cash business post trade services operation to Johannesburg for FX Cash and MM products. From

the onset there were challenges such as high attrition, lack of solid management structure and limited global experience of the newly formed team. The project charter for the DFX Process Transformation project is shown in Figure 48.

The timeline for delivery is 16 weeks from initiation using a proven approach and methodology as shown in Figure 49 . KPMG was leading UK implementation with Barclays GBT resources heading overseas implementations with KPMG oversight, i.e. playing a project governance role. The project governance framework for the overall global programme is illustrated in Figure 50 (KPMG, 2013).

The project was aimed at delivering operational efficiencies on initiatives that could be delivered in the 16 week window of the implementation. Improvements that could only be analysed and/or implemented beyond the timelines of the effort or delivery window were therefore tabled to the broader business as strategic recommendations for consideration in subsequent initiatives.

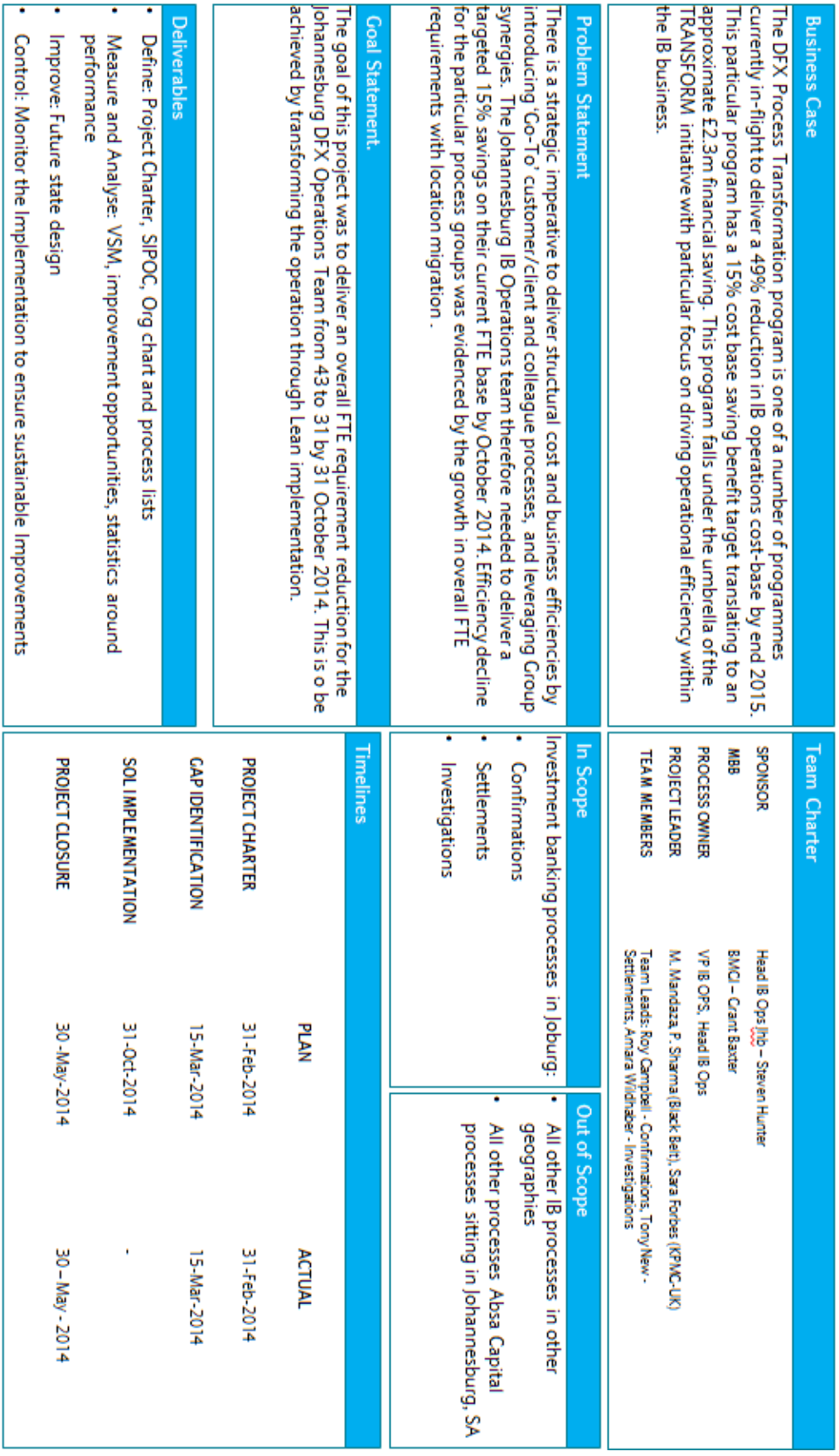


Figure 48: DFX Process Transformation Project Charter

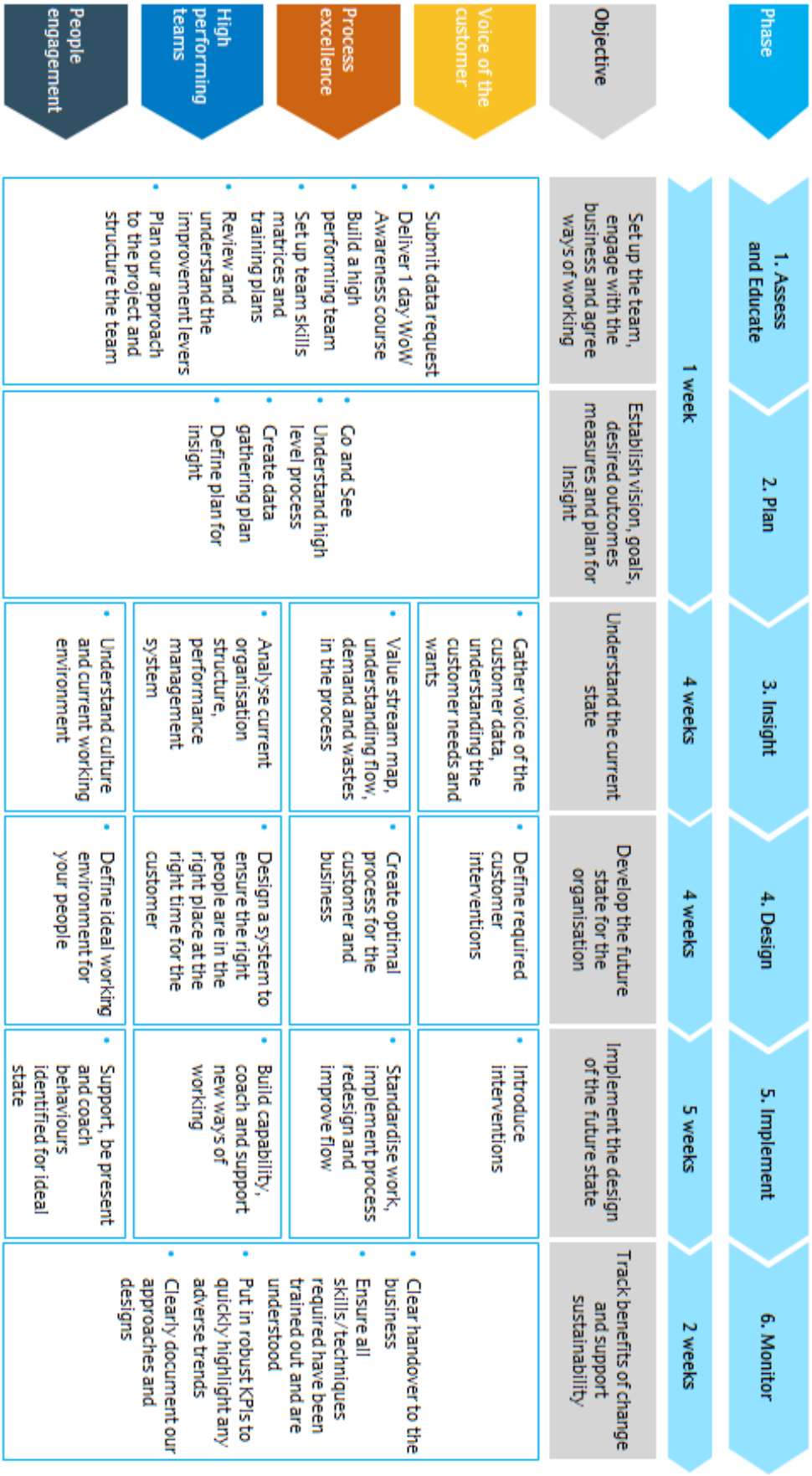


Figure 49: Project Management Framework

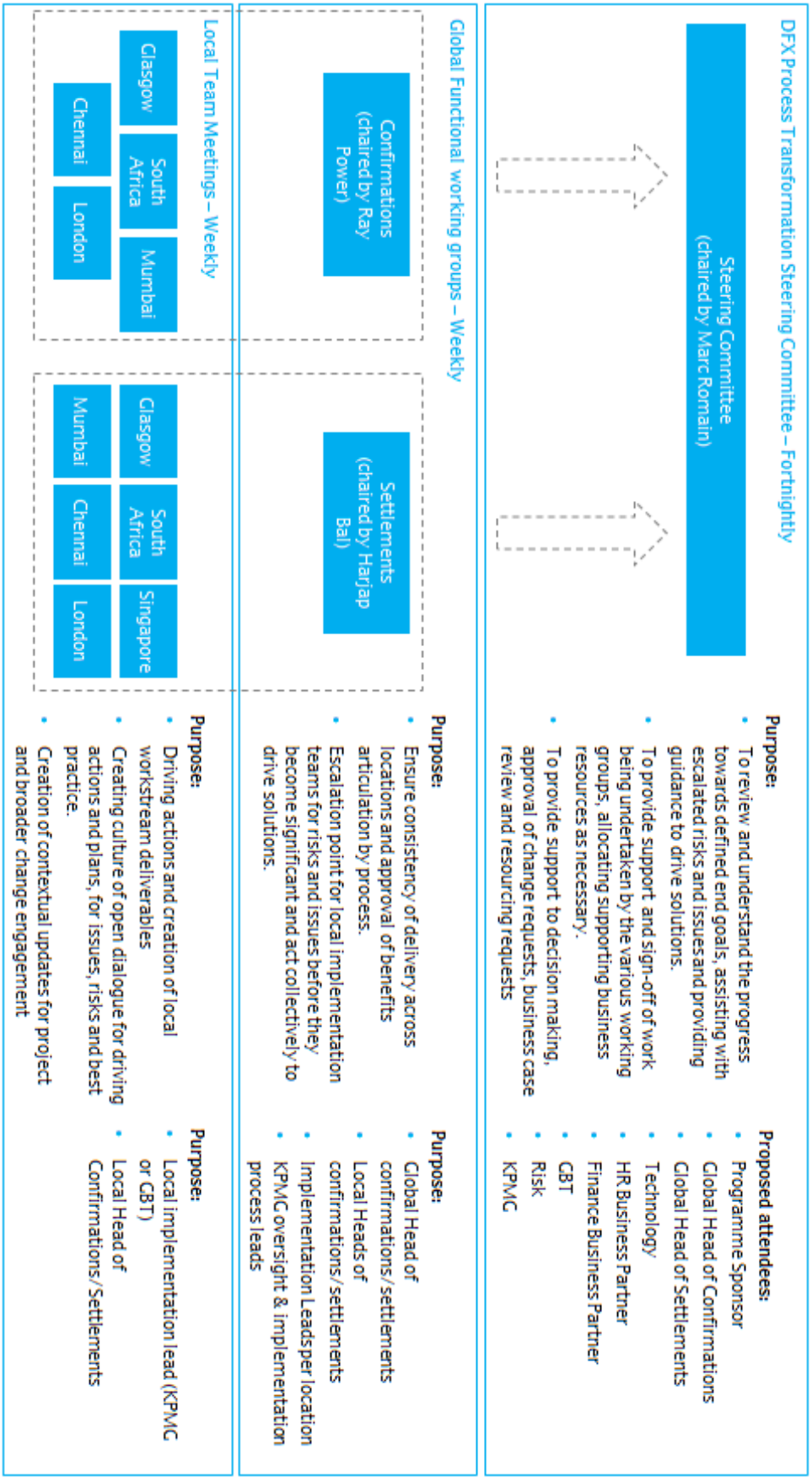


Figure 50: Project Gorvenance Framework

8.3.2 DFX Processes

An overview of the global FX process operations is shown in Figure 51. The DFX Operation team only operate as a post trade service that handles excerptions and queries related to the overall trading process.

Trading, processing and settlement take place on various internal and external platforms. This inherently inferred complexities in terms of standardisation, data interface and operational efficiency. A high level summary of the complex relation of systems and the related trade and message data flows for the FX operation are illustrated in Appendix A. An investigation into the efficiency of the systems infrastructure was outside the scope of this work. References to the different systems are however made with in the narrative of this project work.

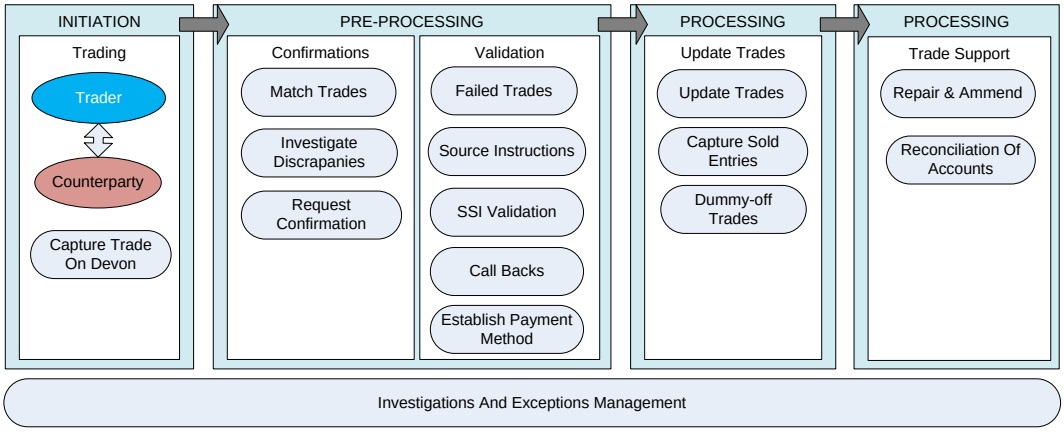


Figure 51: Global FX Operations Overview

Process mapping was carried out to create a clear picture of the process landscape for the project. Due to the complexity of the processes a hierarchical approach was taken in illustrating the process flows. Figure 52 shows the breakdown structure of the maps used in this document.

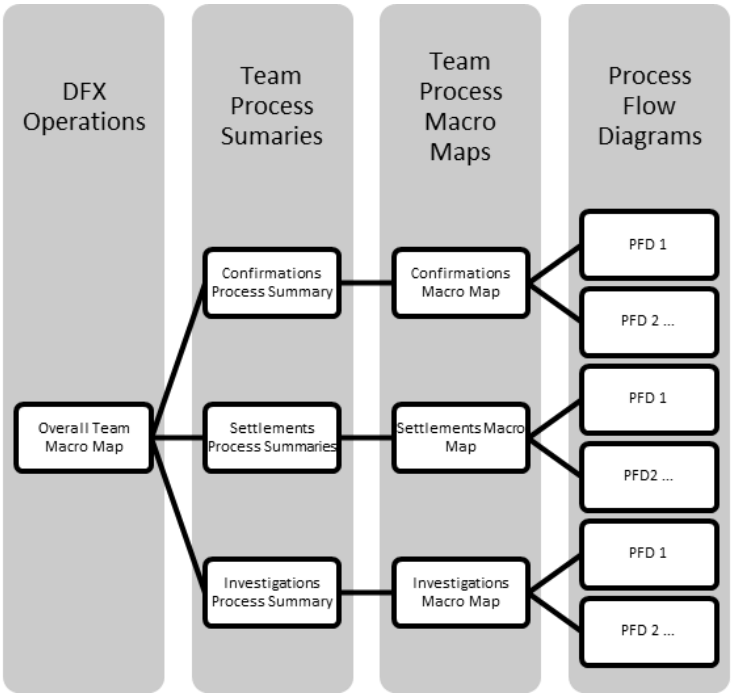


Figure 52: DFX Operations Process Mapping Hierarchy

8.3.2.1 DFX Operations Macro Map

The macro map for the DFX Operations team is illustrated in Figure 53. This shows the exceptions handling purpose of the team as STP transactions do not need to be handled by any of the three functions.

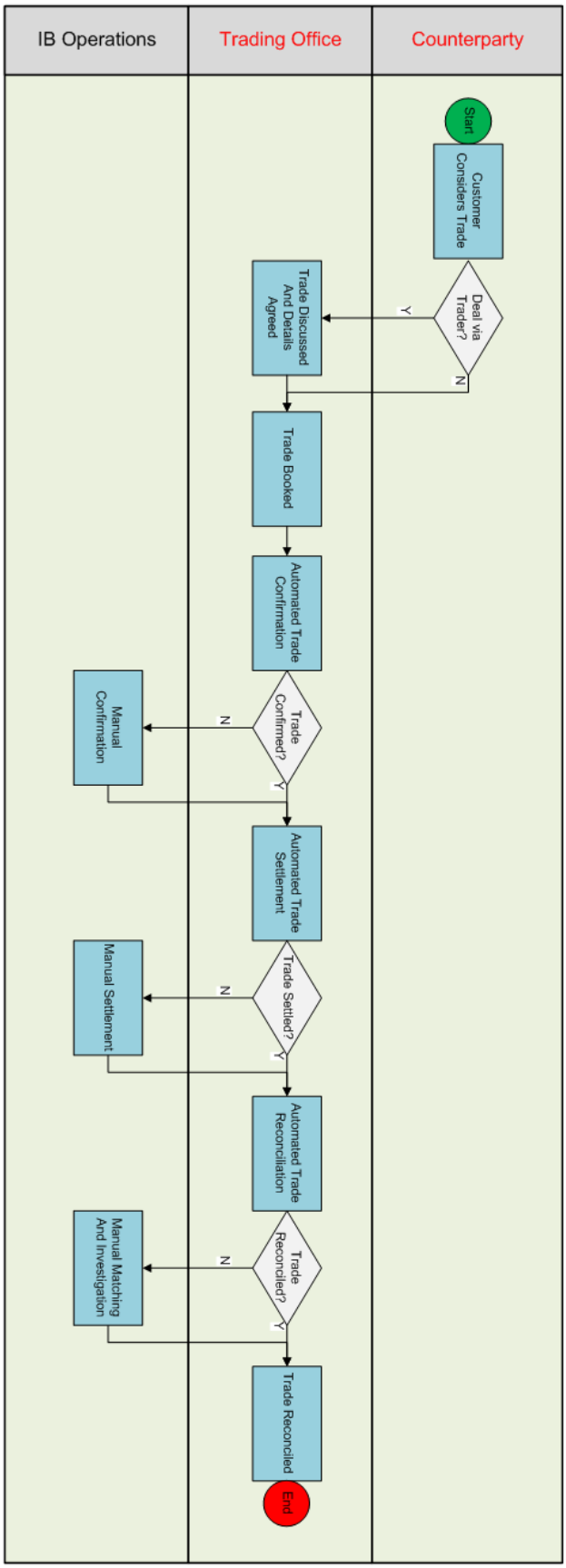


Figure 53: DFX Operations Macro Map

8.3.2.2 Confirmations

The process summaries for the Confirmations team are split into incoming and outgoing confirmations. Incoming confirmations are for trade messages coming from other institutions and are handled as illustrated in Figure 54. Outgoing confirmations are the messages sent out to counterparties for trades affected on the Barclays platform as illustrated in Figure 55.

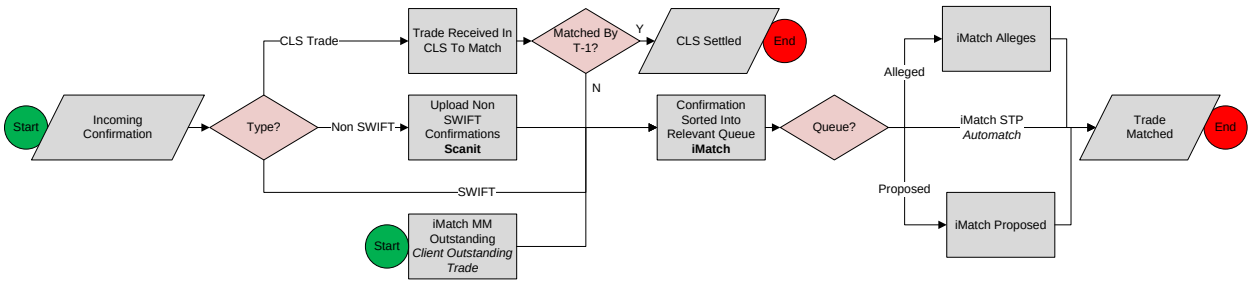


Figure 54: Incoming Confirmations Process Summary

Table 22 shows the summary SIPOC for incoming confirmations.

Table 22: Incoming Confirmations SIPOC

S	I	P	O	C
Imatch Counterparty CLS System	Outstanding CLS Trades Non Swift Confirmations	Upload CLS and Non SWIFT Confirmations	Confirmations ready to feed into Imatch	Imatch
Imatch	Electronic Confirmations	Sort confirmations into relevant queues	Queue sorted confirmations	Confirmations Analyst
Confirmations Analyst	Confirmations in respective quest	Imatch Alleges/Imatch Proposed	Matched/resolved trades	Imatch

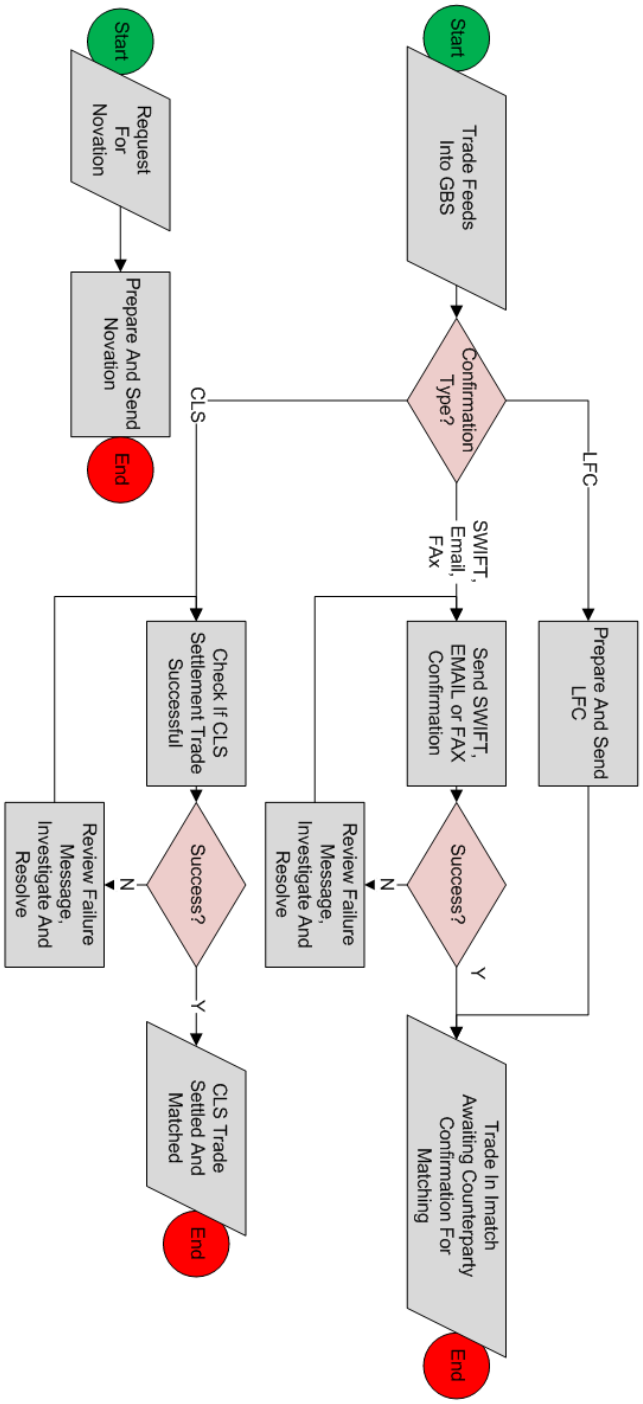


Figure 55: Outgoing Confirmations Process Summary

Table 23 shows the summary SIPOC for outgoing confirmations.

Table 23: Outgoing Confirmations SIPOC

S	I	P	O	C
GBS	Booked trades	Send outgoing confirmations	Confirmations in Imatch waiting for matching	Imatch
Counterparty	Request for Novation	Prepare and send Novation	Completed Novation document	counterparty

The overall macro map for the confirmations process is shown in Figure 56 .

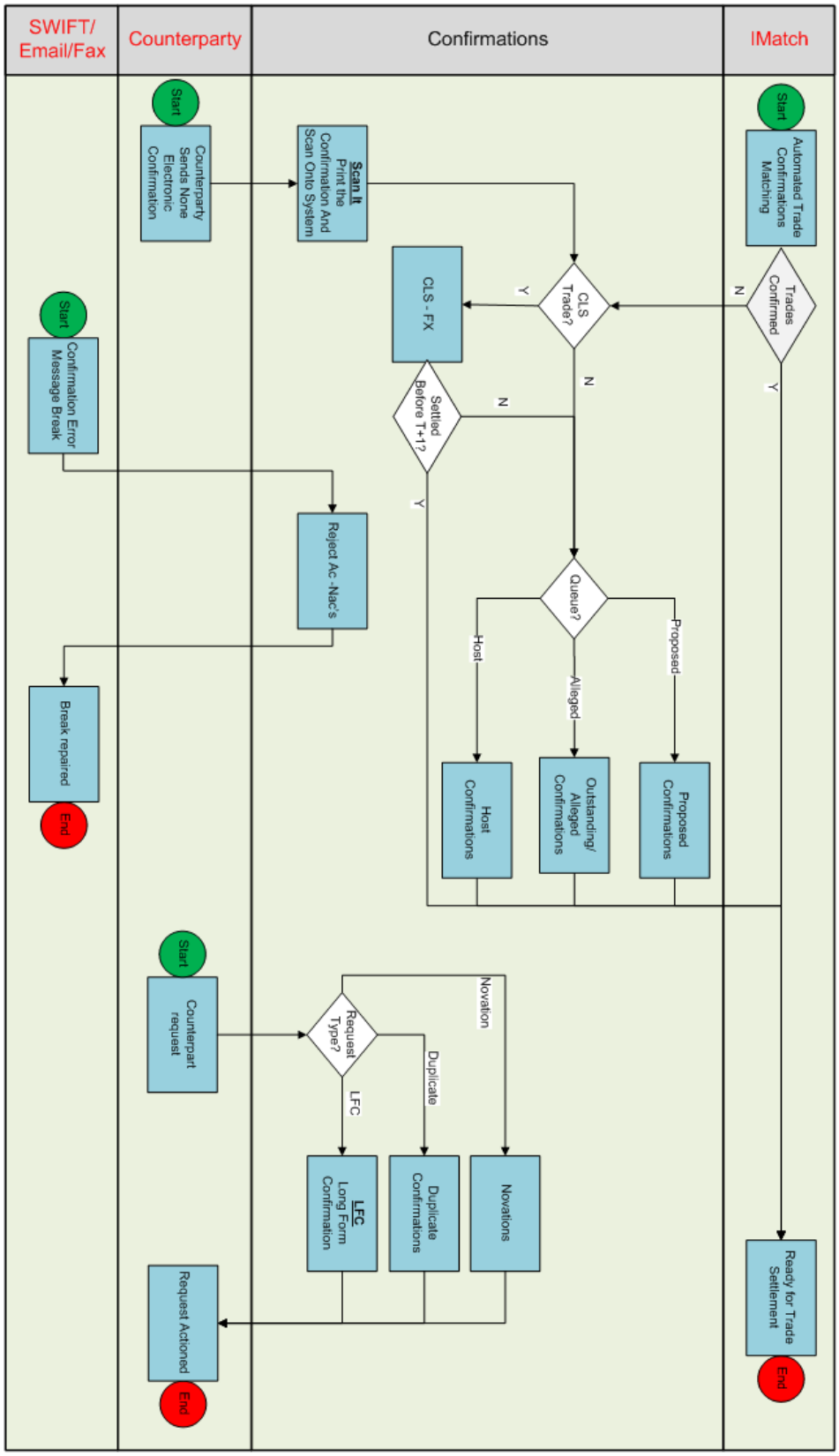


Figure 56: Confirmations Macro Map

8.3.2.3 Settlements

The Settlements team affect payments on valid trades that did not STP. The process summary for the settlement process is illustrated in Figure 57. Table 24 also shows the summary SIPOC for the settlements team.

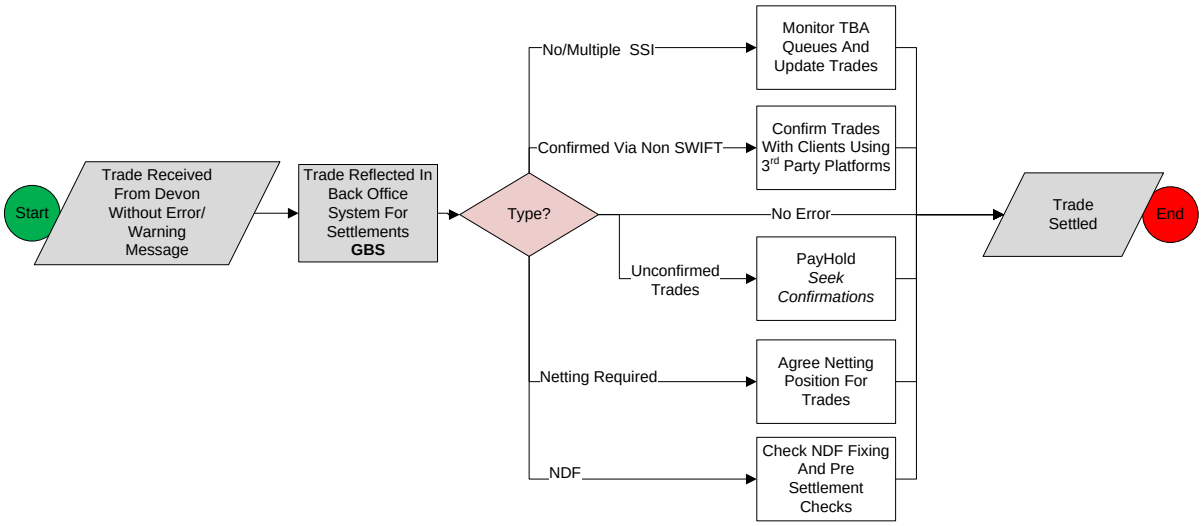


Figure 57: Settlements Process Summary

Table 24: Settlements Summary SIPOC

S	I	P	O	C
GBS	Booked trades	Fix Settlement Breaks	Trades ready for settlement	Imatch

Due to functional process variations the macro maps for the team are split according to FX, MM and NDF asset classes and are shown in Figure 58, Figure 59 and Figure 60 respectively.

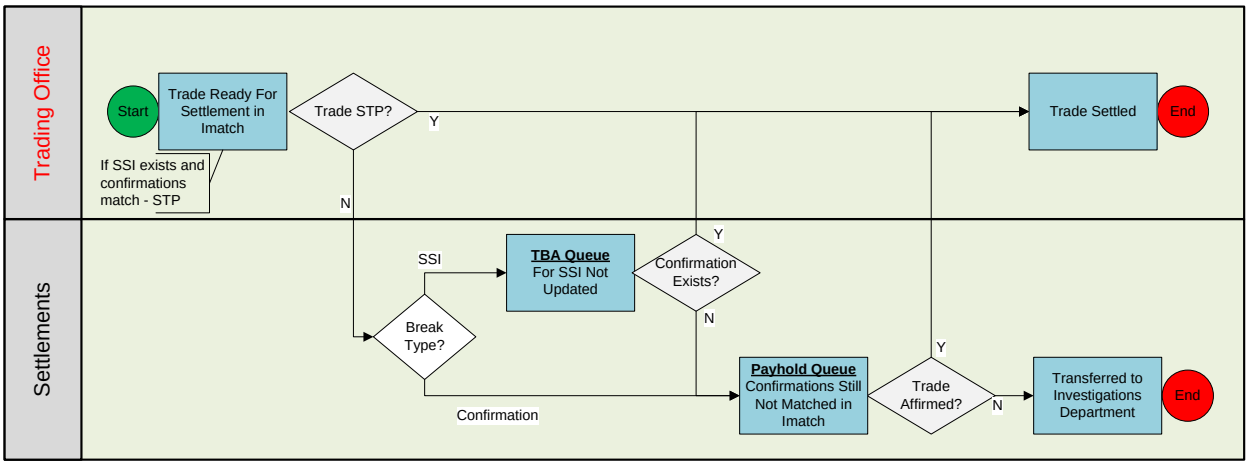


Figure 58: Settlements FX Macro Map

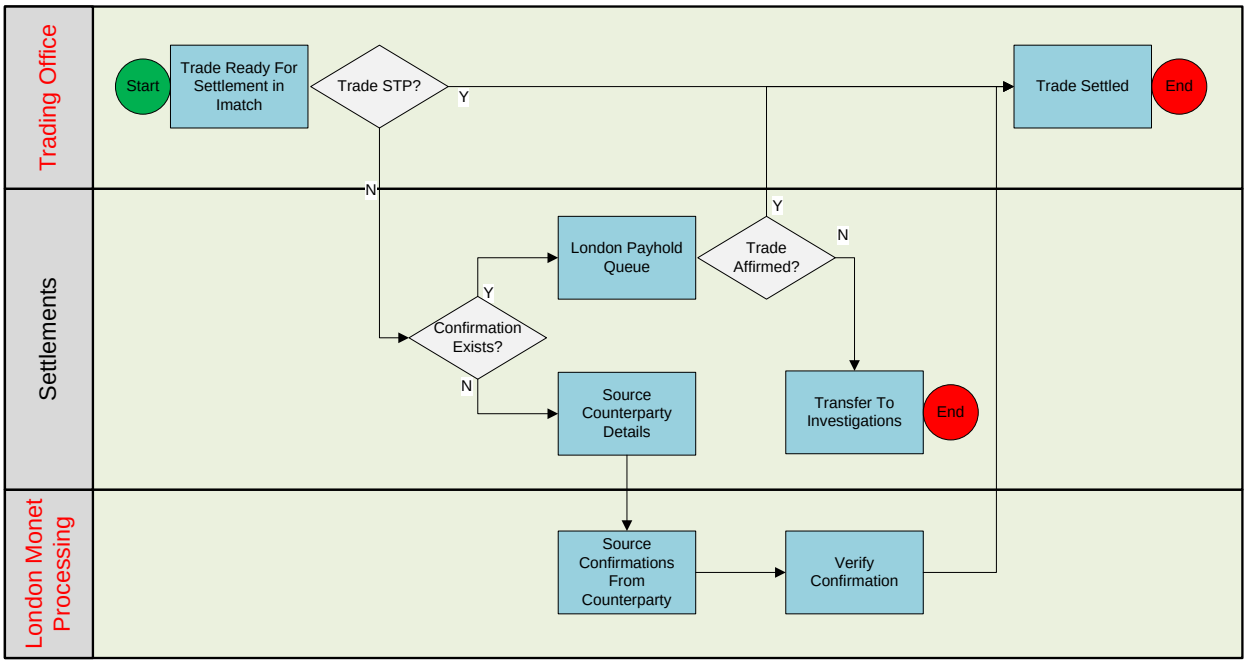


Figure 59: Settlements MM Macro Map

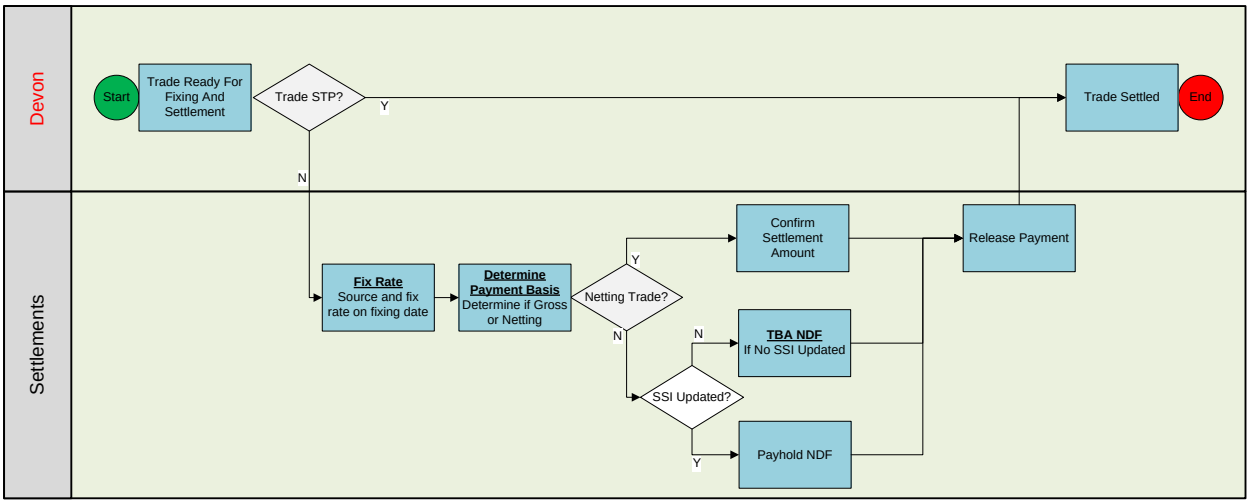


Figure 60: Settlements NDF Macro Map

8.3.2.4 Investigations

The investigations team are responsible for analysing post confirmation and settlement breaks. The process summary and macro map for the Investigations are illustrated in Figure 61 and Figure 62 respectively. Table 25 also shows the summary SIPOC for the settlements team.

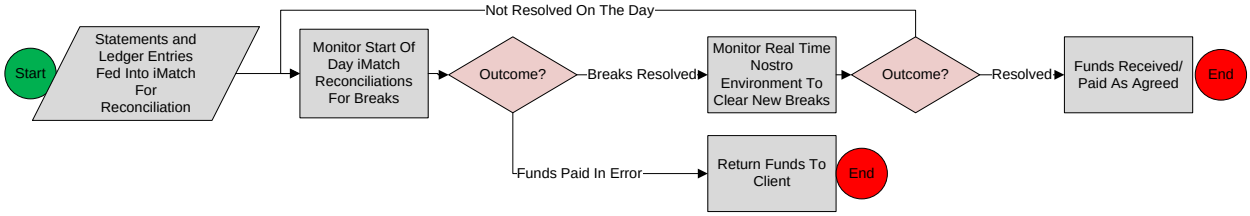


Figure 61: Investigations Process Summary

Table 25: Investigations summary SIPOC

S	I	P	O	C
GBS Counterparty	Statements and Ledger entries	Reconciliation Break Investigation	Resolved entries for reconciliation	Imatch

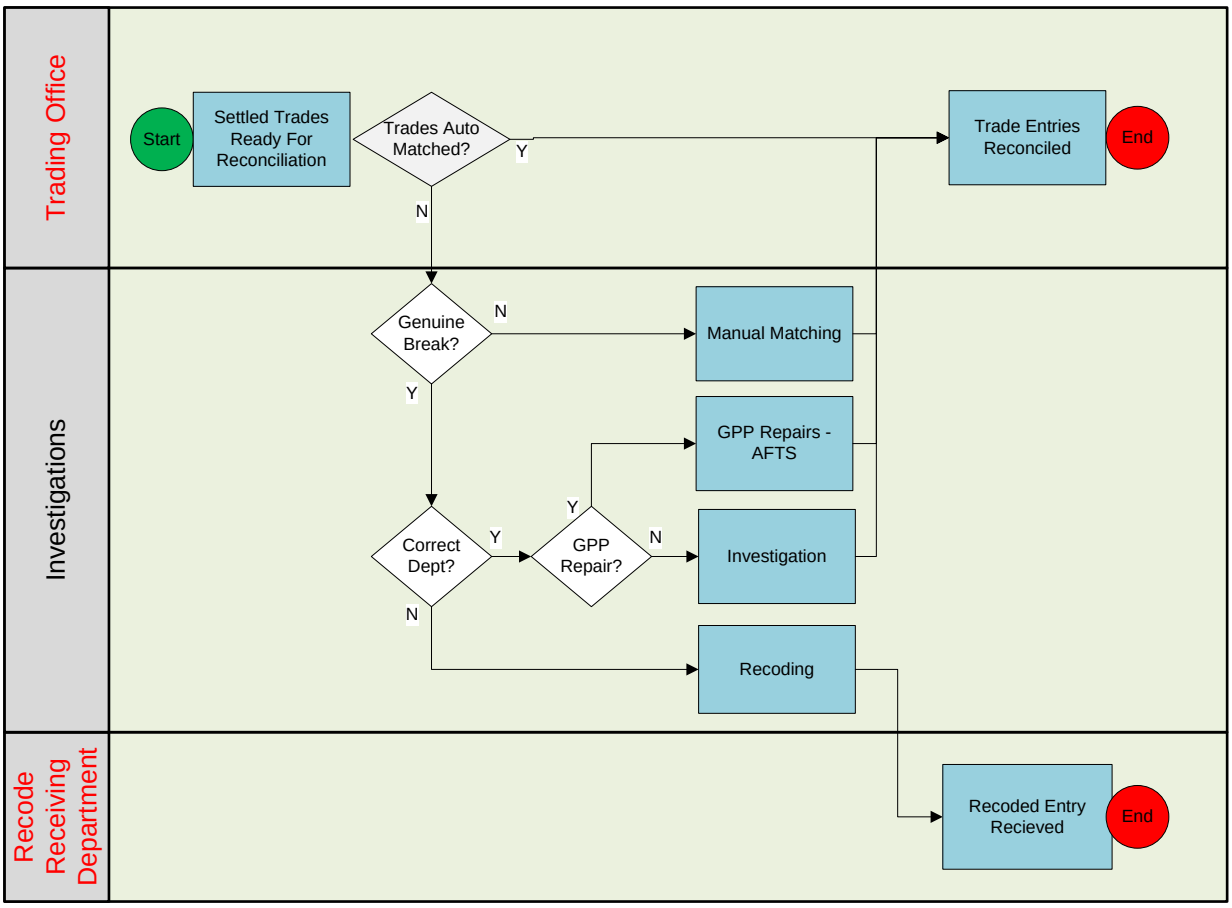


Figure 62: Investigations Macro Map

8.3.3 Voice of the Customer (VOC)

The VOC was collected from the team via a "Pain Points" deck compiled by the team management. This was aimed at providing a starting point to develop high level recommendations to meet customer expectations. The pain point themes for the three teams are summarised in Figure 63, Figure 64 and Figure 65.

The business also identified the following factors as key requirements for the success of the project:

- Senior leadership sponsorship;
- Wider business engagement and partnership in defining and implementing recommendations;
- Funding of SMEs on the ground;

- Prioritization of recommendations within the wider Barclays business (e.g. system enhancements).

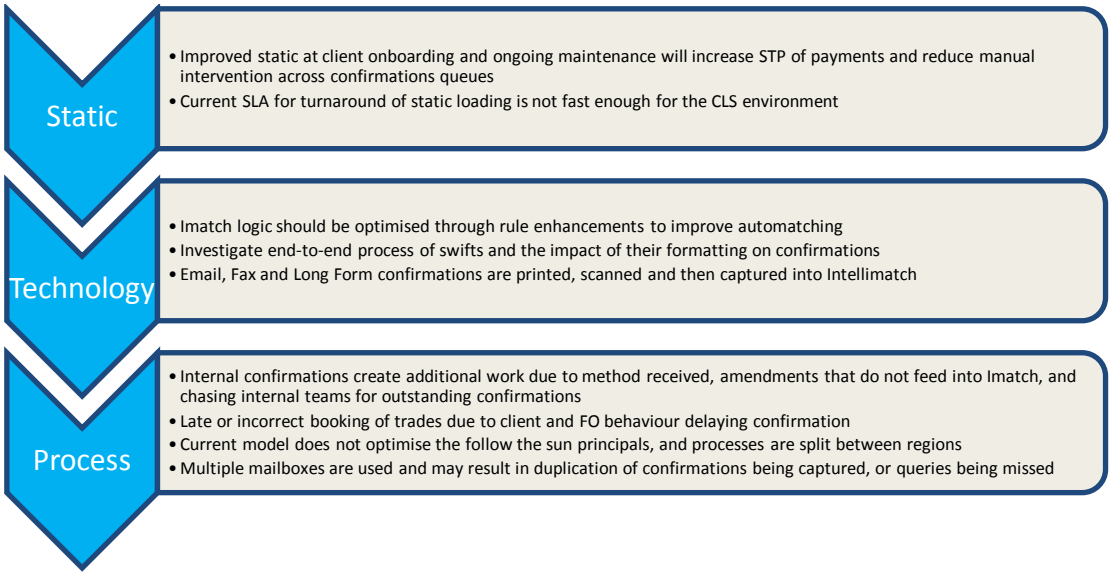


Figure 63: Confirmations Pain Point Themes

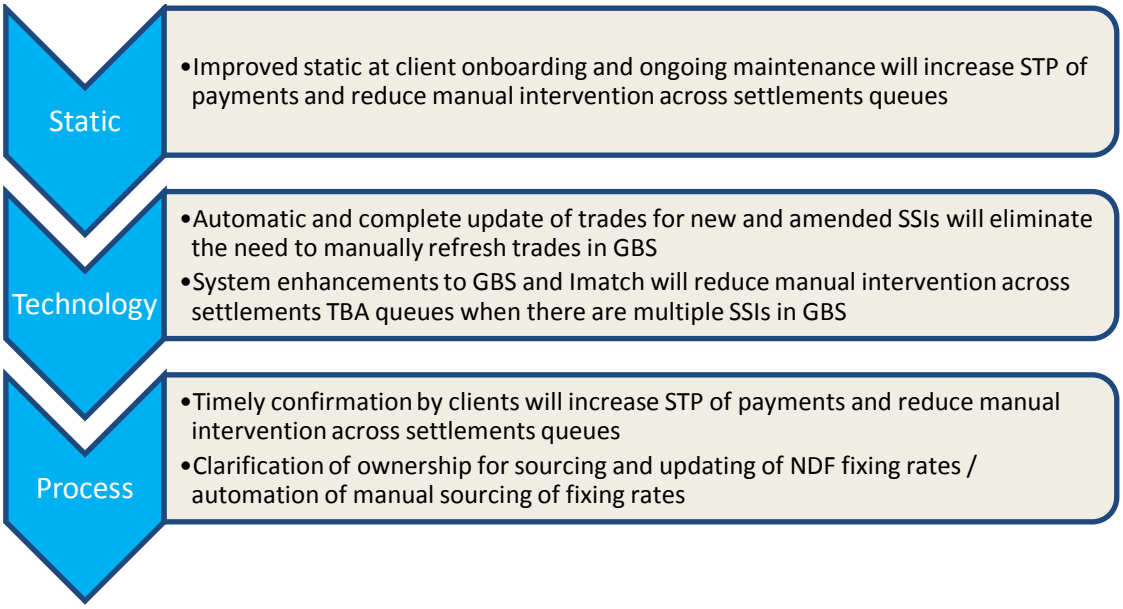


Figure 64: Settlements Pain Point Themes

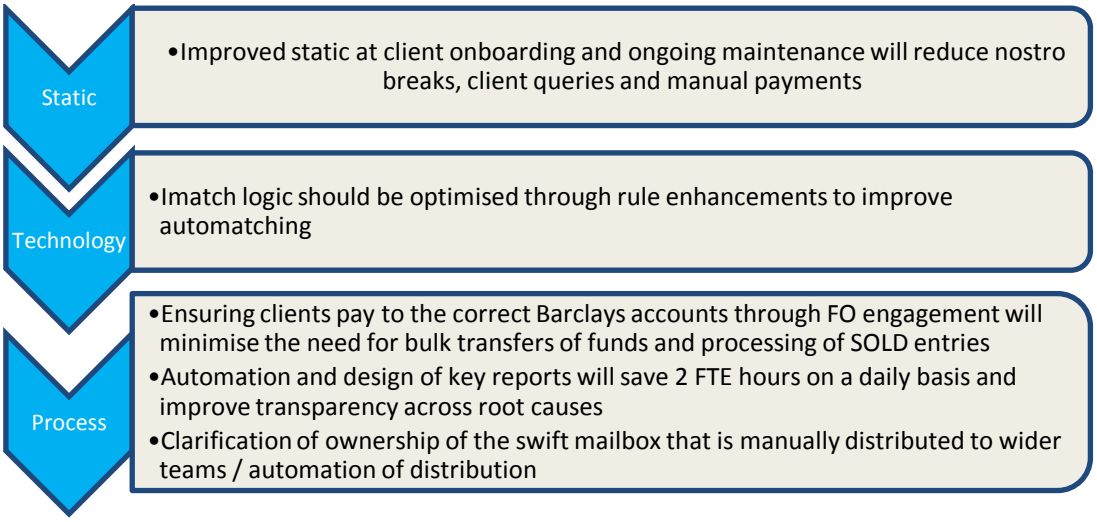


Figure 65: Investigations Pain Point Themes

A prioritization flag of high/medium/low was assigned to each opportunity based on a high level assessment of business need and impact:

- Risk mitigation through automation;
- Efficiency gains to support regulatory compliance;
- FTE hours saved;
- Output of root cause analysis.

Enhancements around automation of reporting and analysis were also identified across all the teams especially for end of day reports and manual reports produced for regulatory requirements. Availability and development of detailed reports can also support subsequent root cause analyses of exceptions queues.

8.3.4 Communication Plan

The communication plan for the project is shown in Table 26. The communication framework had a strong emphasis on stakeholder involvement and feedback hence the high frequency of meetings and teleconferences indicated in the plan.

A Design Authority schedule was also set up to enable the communication of design solutions across global locations. All locations we allocated certain initiatives to head up in terms of design and initial testing and subsequent transfer to the other locations where implementation is applicable.

Table 26: DFX Process Transformation Project Communication Plan

Who?	What?	When?	Why?	How?	By Whom?
DFX Ops Management, KPMG	Daily Update	Daily	Provide an update of the previous day's activities and plan for the day, Risks and issues	Meeting / Teleconference	GBT Resource
KPMG	Daily Meeting	Daily	Provide an update of the previous day's activities and plan for the day, Risks and issues	Meeting / Teleconference	GBT Resource
SMEs	Daily Huddle	Daily	Provide an update of the previous day's activities and plan for the day, Risks and issues	Meeting / Teleconference	GBT Resource
Programme Sponsors, GBT Management, DFX Management, KPMG	Weekly Update	Once weekly	Provide a weekly update for the progress made and plans for the following week, Risks and issues	Meeting / Teleconference	GBT Resource
KPMG, GBT resources	Weekly LMS update	Once weekly	Update on LMS progress, Training on LMS modules	Teleconference	KPMG
SMEs, DFX Ops management	Weekly training modules	Once weekly	Deliver LMS training to local SMEs and management as per KPMG framework - until training modules are complete	Meeting	GBT Resource
Global DFX Operations SMEs, KPMG, GBT resources	Design Authority on each improvement initiative	As per design authority schedule below	Design Authority on each improvement initiative	Meeting / Teleconference	Location initiative management

8.4 MEASURE

Value stream assessments (VSA) were conducted in order to identify waste, highlight quick hits and expose opportunities for simplification. The VSMs for the three teams, including the gaps identified, are shown in Figure 66 to Figure 68. The indicated volumes, cycle times and capacity demands were gathered from a sample study as system data was not available at the start of the analysis. The lack of system data resulted in a recommendation being made for the implementation of a strategic workflow solution which allows for the effective handling of work and data collection.

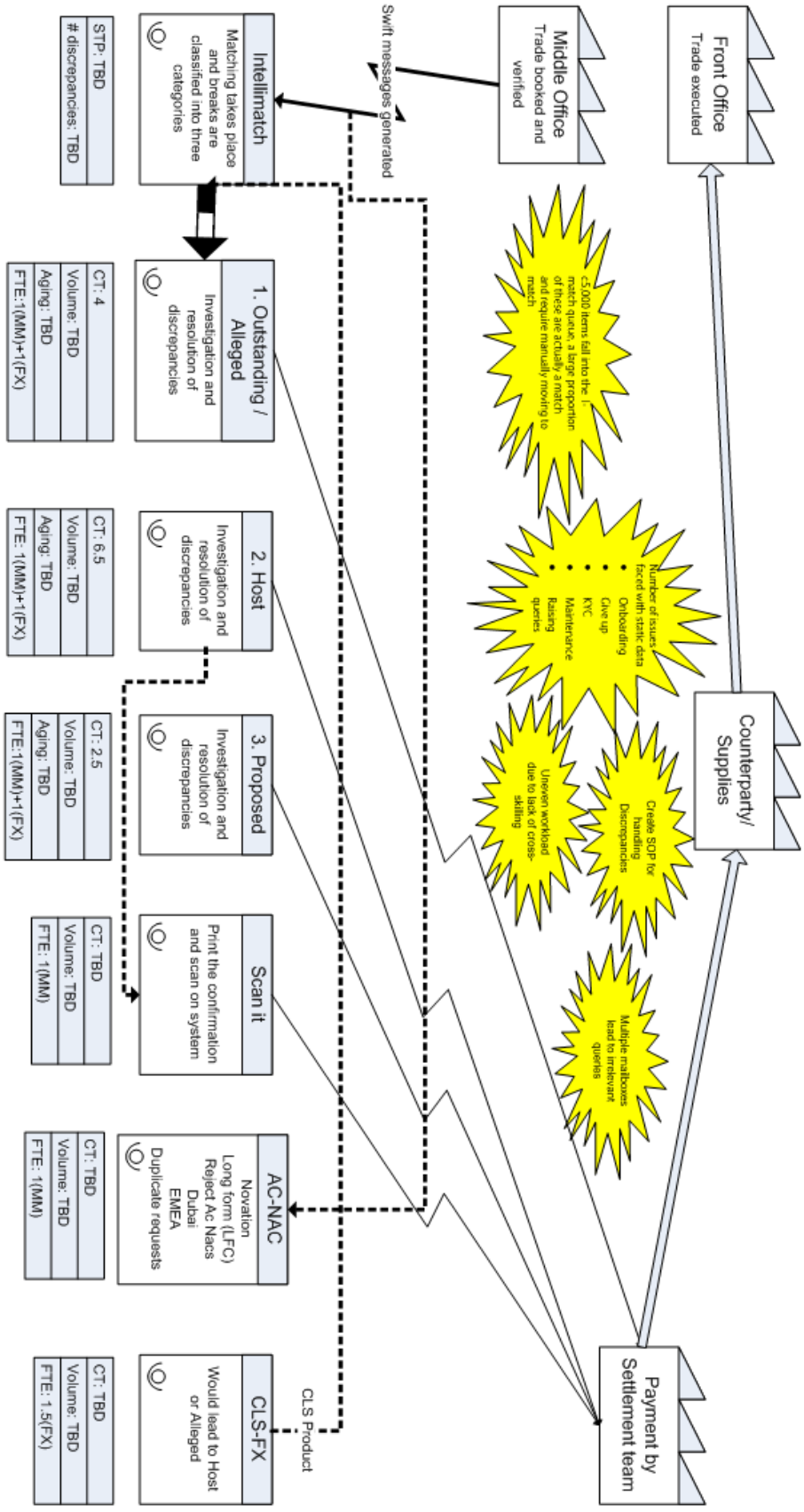


Figure 66: Confirmations Summary VSM

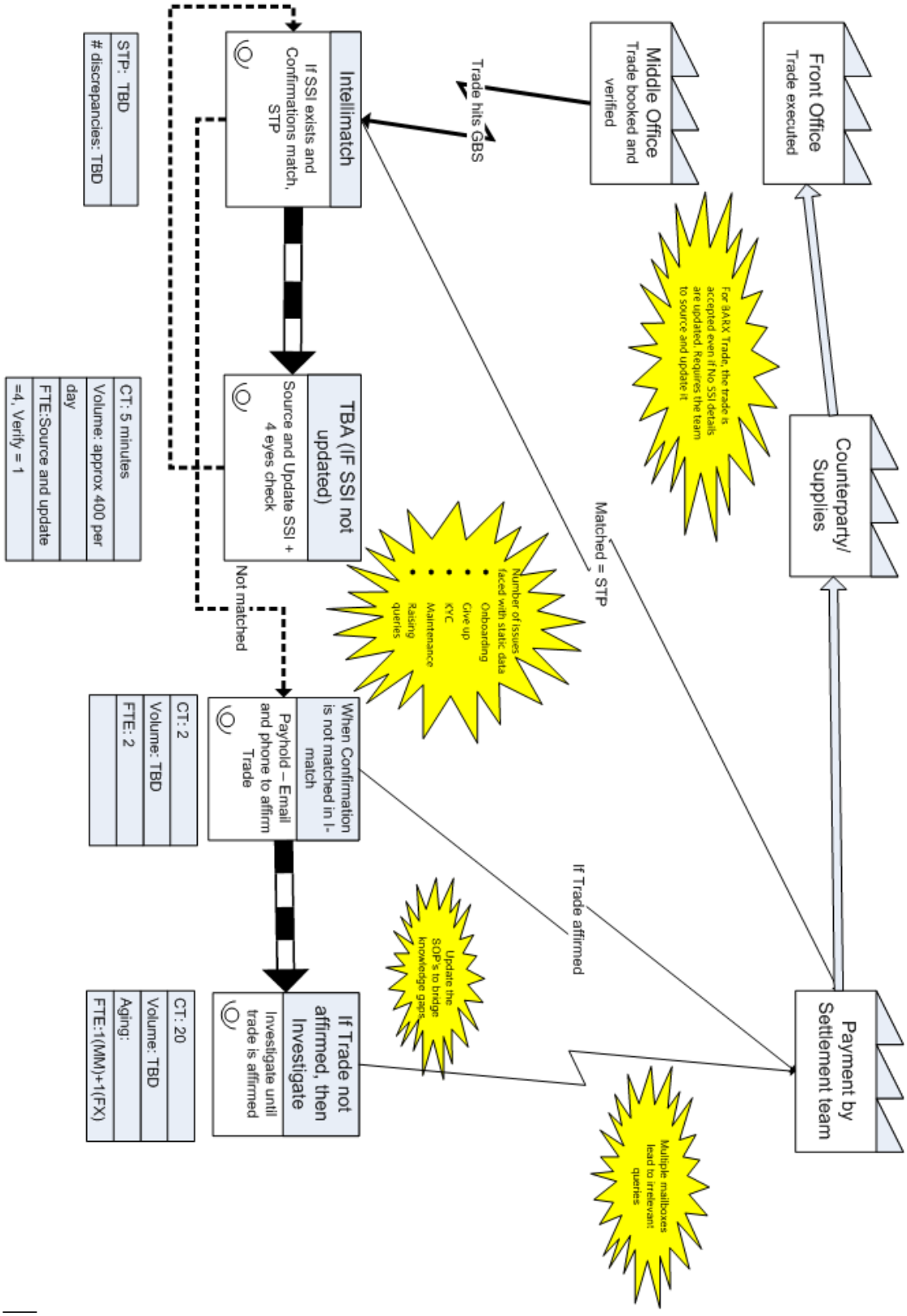


Figure 67: Settlements Summary VSM

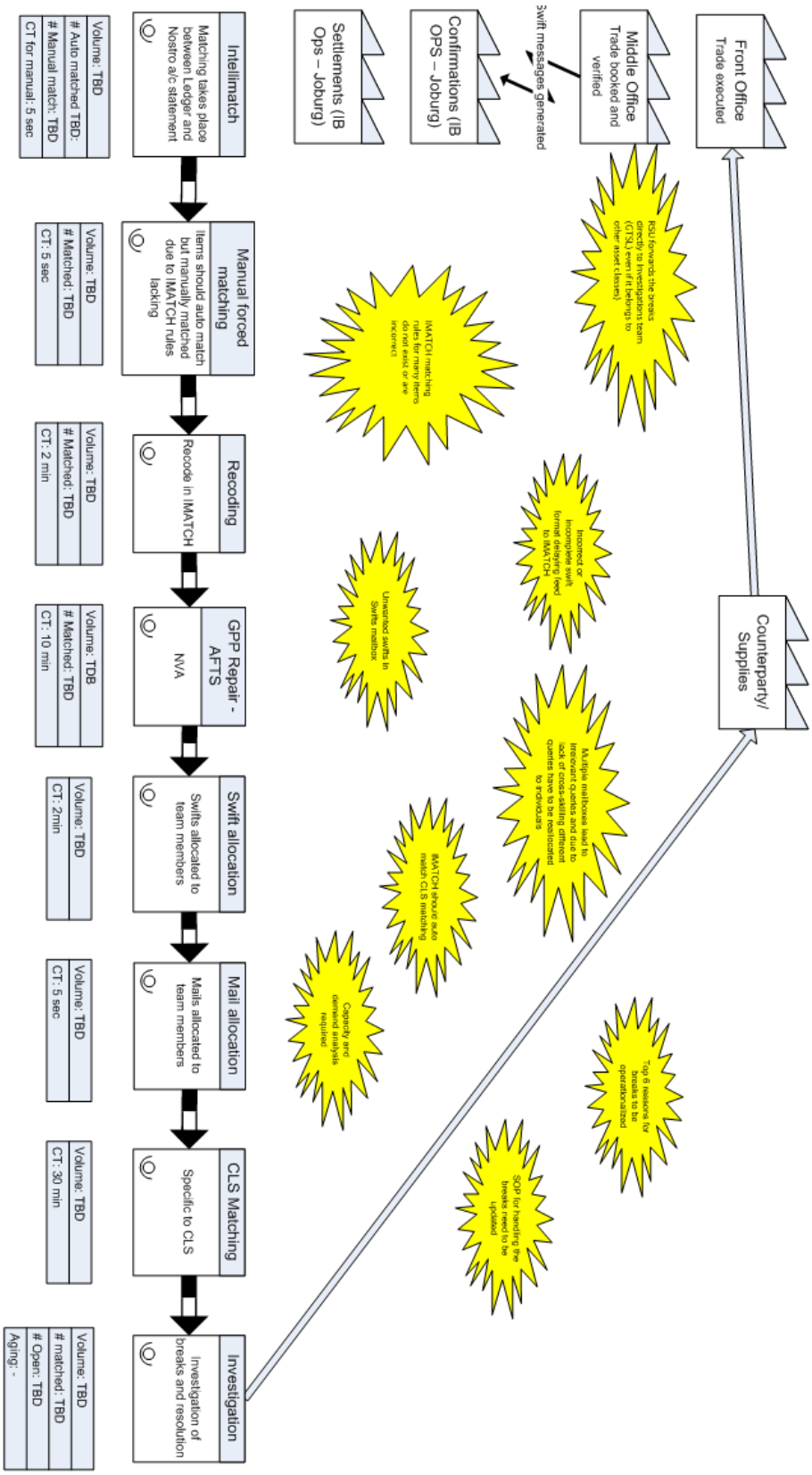


Figure 68: Investigations Summary VSM

Further analysis was conducted to come up with a view of the overall process efficiency (OPE) of the team versus the performance gaps identified. Figure 69 is a sample extract from the DILO (Day in the Life Of) template used to gather the work day content data.

Date	Date
Department	Confirmations
Name	Analyst 1
Title	Dilo 1

Time	Activities	Classification
09:00	matu-manual match	InteliMatch Matching
09:05	chng/cedelull-triparty	Core Tasks
09:10	misys-manual match	InteliMatch Matching
09:15	cls mailbox management	Mailbox Management
09:20	cls emails	Mailbox Management
09:25	cls emails	Mailbox Management

Figure 69: DILO Template Extract

The data collected was classified according to activity grouping and collated at individual then team level. This therefore resulted in overall team level OPE estimates for the 3 teams. A sample of a team collation is shown for the Confirmations team in Table 27. Graphical analysis of the DILO data is also shown in the pie chart and waterfall diagrams in Figure 70 and Figure 71 respectively. The analysis showed high levels of overtime utilisation mainly due to capacity lost to the following gaps:

- SSI;
- Mailbox management;
- Manual matching gaps;
- System latency and;
- Knowledge gap.

Table 27: Collated Team DILO Summary - Confirmations

Categories	Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5	Analyst 6	Analyst 7	Analyst 8	Analyst 9	Analyst 10	Analyst 11	Analyst 12	Total	Avarage
Core Tasks	352.50	87.00	84.00	249.00	250.50	127.50	111.00	144.86	255.00	93.30	327.00	201.75	2283.41	190.28
Email Investigation	35.00	39.00	61.67	200.00	95.00	167.50	80.00	69.29	240.00	258.00	86.67	60.00	1392.12	116.01
InteliMatch Matching	0.00	292.00	151.67	0.00	5.00	33.75	256.67	15.71	0.00	0.00	11.67	0.00	766.46	63.87
Mailbox Management	20.00	86.00	191.67	2.50	75.00	8.13	40.00	21.43	0.00	30.00	25.00	187.50	687.22	57.27
Meetings	10.00	0.00	0.00	0.00	1.67	114.38	0.00	277.86	0.00	36.00	20.00	0.00	459.90	38.32
Breaks	25.00	15.00	28.33	30.00	28.33	48.75	21.67	43.57	28.33	29.00	38.33	45.00	381.32	31.78
Knowledge Gap/Consultantions	44.17	15.67	44.33	27.67	44.50	32.92	12.33	25.38	28.33	10.37	43.00	22.42	351.08	29.26
System Issues/Latency	23.33	23.33	23.33	23.33	23.33	23.33	23.33	23.33	23.33	23.33	23.33	23.33	280.00	23.33
SSI Gap	20.00	3.00	0.00	17.50	16.67	8.13	5.00	4.29	0.00	83.00	10.00	0.00	167.58	13.96
Training	0.00	0.00	0.00	0.00	0.00	61.88	0.00	0.00	0.00	22.00	0.00	0.00	83.88	6.99
Total Time (Min)	530.00	561.00	585.00	550.00	540.00	626.25	550.00	625.71	575.00	585.00	585.00	540.00	6852.96	571.08
Total Time (Hrs)	8.83	9.35	9.75	9.17	9.00	10.44	9.17	10.43	9.58	9.75	9.75	9.00	114.22	9.52

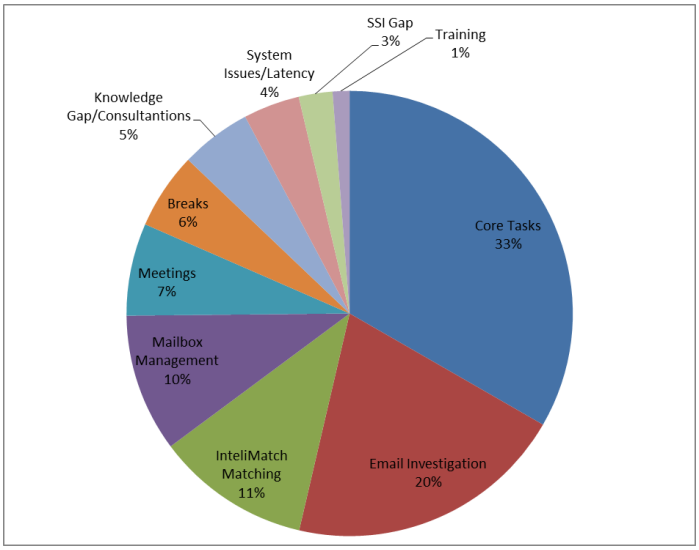


Figure 70: DILO Analysis Proportion of Tasks – Confirmations

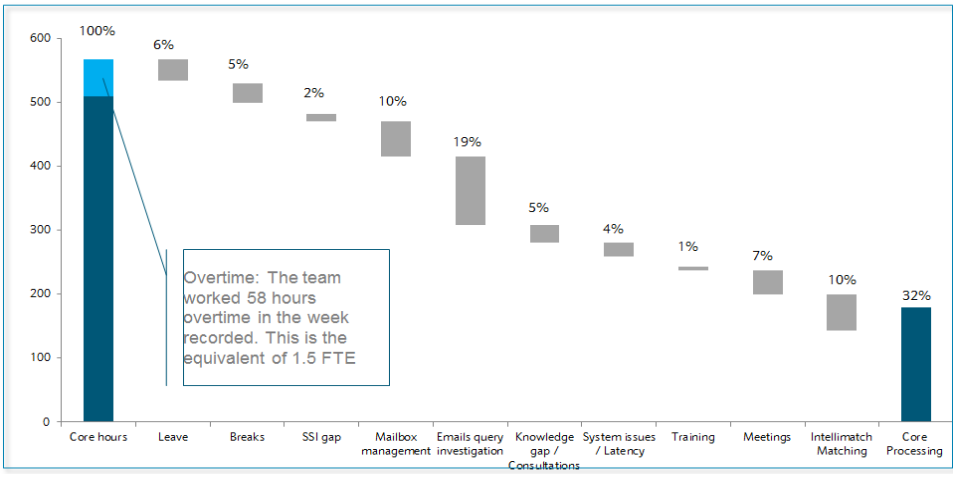


Figure 71: OPE Waterfall Diagram – Confirmations

8.5 ANALYSE

A root cause analysis workshop was conducted with the SME across the three teams on the gaps identified in the VSA and analysed via the OPE. The sections below highlight the approach taken for Management System, SSI, mailbox management and IntelliMATCH matching rules gaps.

8.5.1 Management System

The management system was reviewed prior to the implementation of the project and the gaps identified are summarised in the fishbone diagram shown in Figure 72. The knowledge gap identified in the DILO analysis was also addressed via the overall qualitative analysis that determined that a Lean management system needed to be established as a best practice approach. Actions taken to address the management system gap will be outlined in greater detail the Improve Phase section.

Assessments showed that neither productivity measurement nor targets were maintained. Capacity management was not done as the systems have not been set up to provide production volume information. SOPs were also used for risk and not sharing best practice with no process confirmation taking place. There was little team engagement on a day to day basis. Coaching was hardly practiced as a form of performance development. There was also no visual management system in place due to the lack of data.

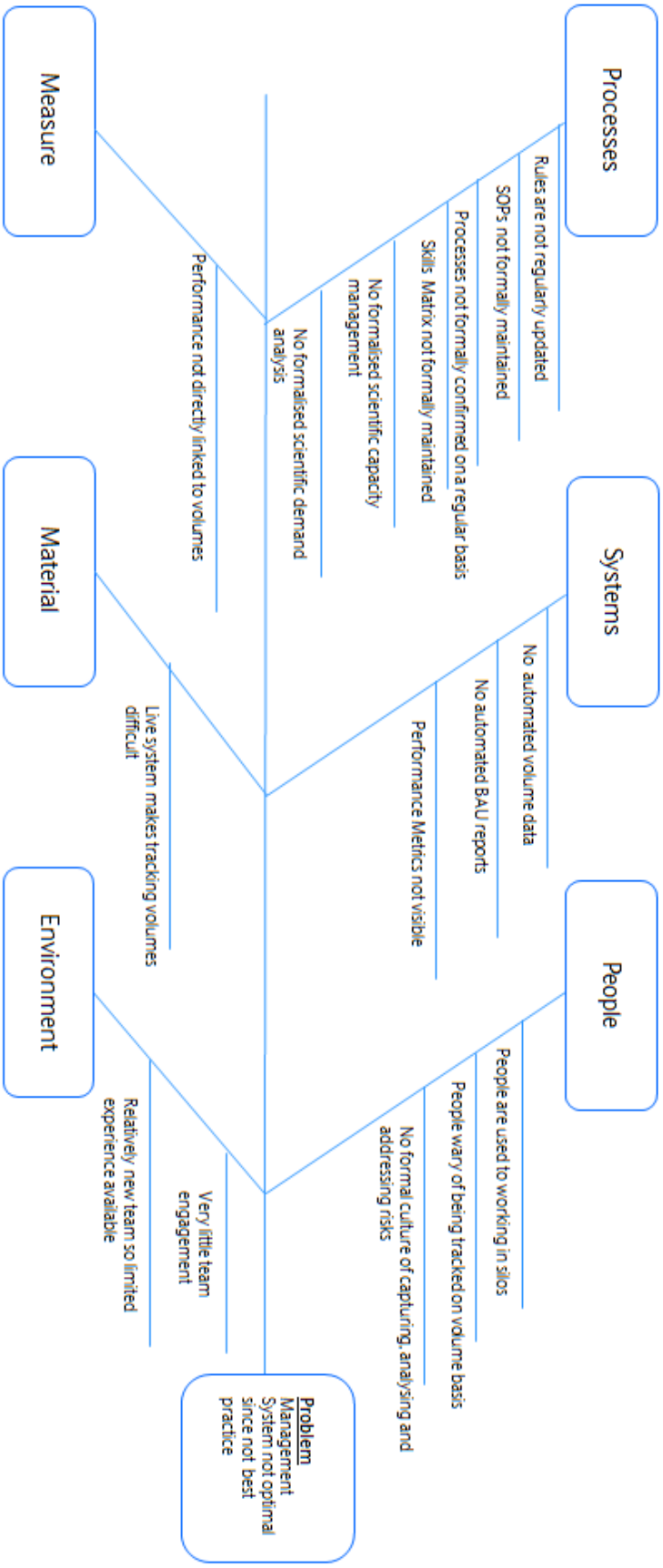


Figure 72: Management System Fishbone Diagram RCA

8.5.2 SSI Gap

The most significant gap identified in the VSA was on SSIs. Missing and incorrect SSIs in essence are the primary root cause for the exceptions based work done by the DFX Operations team. An RCA was done for the SSI gap and illustrated in Figure 73.

Analysis of the resources required to tackle the SSI gap showed that this was not a quick win and would thus not be addressed during the 16 week window of the DFX Process Transformation project. A recommendation to implement a separate project stream to tackle this gap was however submitted to the overall capital business since SSIs have a trans-asset class impact and result in the bulk of the excerptions based work that the post trade service operations teams are handling. The recommendation is currently being reviewed by management for possible implementation.

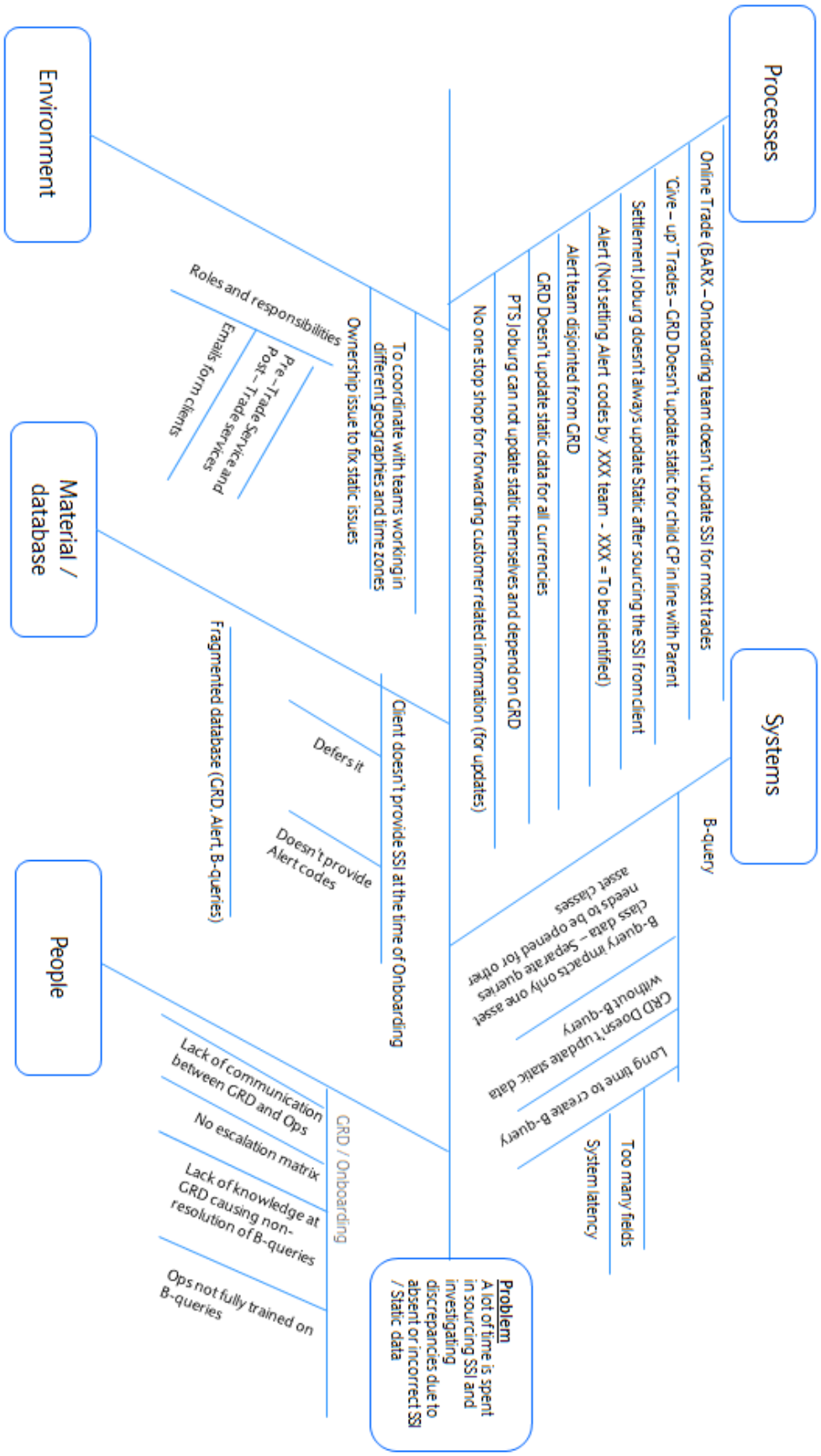


Figure 73: SSI Fishbone Diagram RCA

8.5.3 Mailbox Management Gap

Mailbox management as an administrative task over and above the actual email investigation done was also analysed to get a view of the root contributors to the volumes and pains in the process. Figure 74 shows the fishbone diagram as an output of the RCA done on the mailbox management gap.

The first step in the analysis and quantification was to establish the mailbox access and usage access and usage profile within the team as shown in

Table 28.

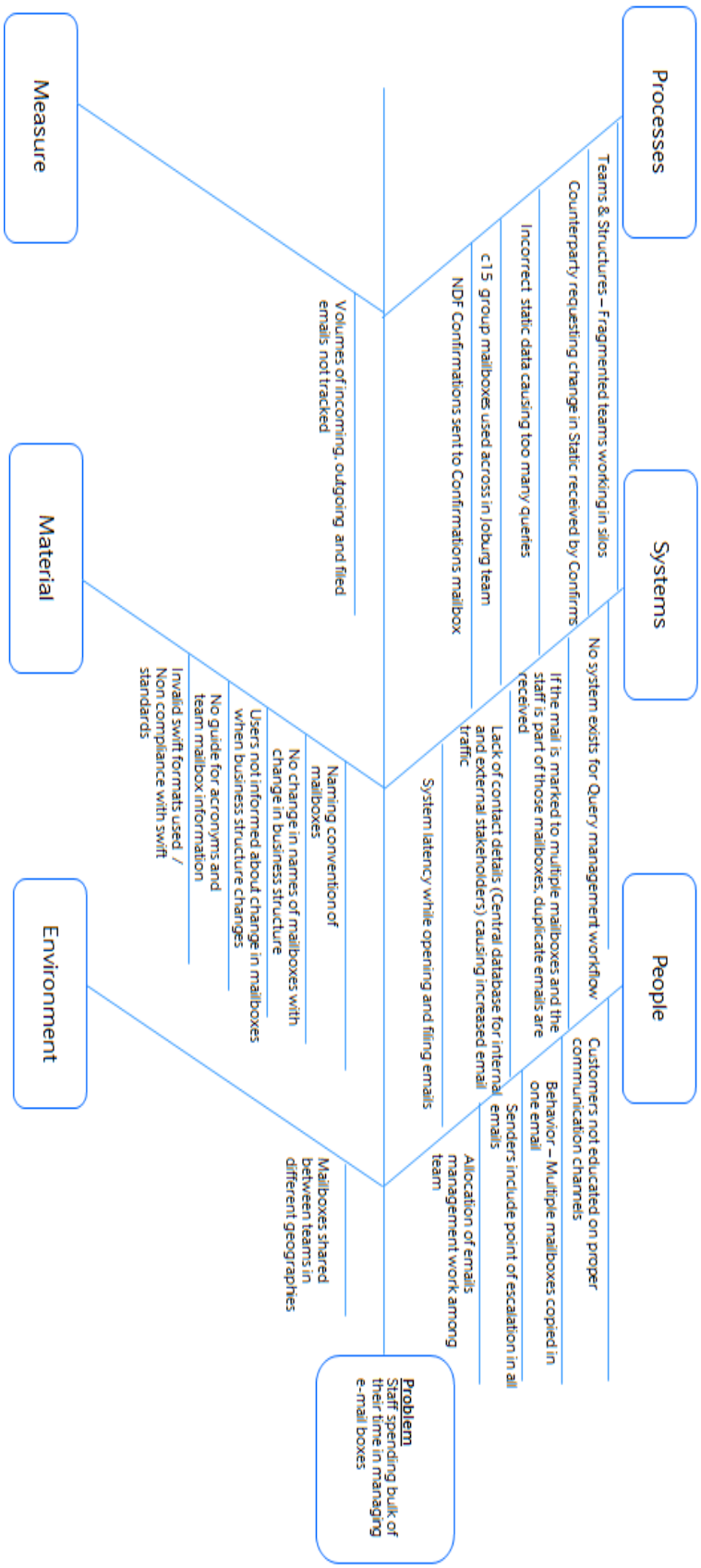


Figure 74: Mailbox Management Fishbone Diagram RCA

Table 28: Mailbox Access and Usage Profile

Mailbox Name	Used By?	Accessed by?	Managed by?	Customer Type	Query types
APConfirmations	Confirmations	13	2	Internal and External	FX and MM Confirmations Queries
SGP LDN SHIFT CHASERS	Confirmations	4	2	Internal and External	Used for all queries
SGP LDN Shift Queries	Confirmations	4	2	Internal and External	Used for all queries
London FX Fax Scanning	Confirmations	13	1	External	Fax Inbox
FX And MM Confirmations	Confirmations	13	1	Internal and External	Send paper confirmations, receive queries
CLS INOUTSWOP	Confirmations	13, NY Team	1 Jhb, NY Team	Internal and External	CLS Queries
Treasury Fax Confirmations	Confirmations	1	1	Internal	Fax Rejects - to be Investigated
Confirmations - recs emails	Confirmations	TBC	TBC	Internal	Used to receive emails with internal rec’s attached
NDF Settlements	Settlements	4	2	Internal and External	Used for all queries: Rates, Confirmations, Outstanding
FXCashPayments	Settlements	8	2	Internal and External	Used for all queries: Rates, Confirmations, Outstanding
EX-Man	Settlements	3	1	Internal	Ex-man queries
GTS London Investigations	Investigations	10	10	Internal and External	Investigations
Treasury AP Investigation	Investigations	5	-	Internal and External	Post Trade Settlement Investigations
SwiftInvGTSLondon	Investigations	15, Global Team	15 Locally	External	Investigations
GLA GTS Authorisations	Investigations	3	3	Internal	Authorisation Requests

A sample was then drawn to determine the behavioural standardisation of the way the mailboxes are managed. A snapshot of the data collected and analysed is shown in Table 29.

The data gathering, analysis and expected benefits approach for the mailbox management gap is as summarised below:

- All None Actioned (NA) items received in the inbox copied to a dummy folder for each mailbox;
- All Actioned (A) items as responded to received mails in the inbox and initiated are extracted from the sent items folder at the end of the day
- Total volume = NA + A;
- Proportion of NA to A is an indicator of effort spent on handling non related emails.

Bad volumes were classified as:

- Mails received but not actioned;
- Mails carbon copied back to the same mailbox and/or other mailboxes in the team.

Effort wasted for each mailbox is therefore the average handling time (0.75 minutes as agreed with SMEs) multiplied by the bad volumes. The effort wastage figure presented is therefore a measure of the total potential savings. Actual savings will be realised as follows:

- The majority of bad volume from carbon copied emails can be addressed with auto-routing rules since this is usually done to serve as an audit trail.
- Savings on the Non Actioned items received can be reduced by implementing similar auto-routing rules and as a consequence of mailbox structure redesign and autoreply education

Table 29: Group Mailbox Behaviour Sample

Department	Mailbox	Moving Items?	Sent Tag	Sent Items Location	Sent Items Archived?	Frequency	Where to?	Sent Items deleted?
Investigations	GTS London Investigations	Yes	On Behalf of	Personal Sent	Yes	Once Weekly	Emails Sent by Date	No
Investigations	GLA GTS Authorisations	Yes	From Personal	Personal Sent	Yes	Once Weekly	Actioned Folder	No
Investigations	SwiftInvGTSLondon	Yes						
Investigations	GTS London Investigations	Yes	On Behalf of	Personal Sent	Yes	When Full	Personal Folder	No
Investigations	SwiftInvGTSLondon	Yes						
Investigations	GLA GTS Authorisations	Yes						
Investigations	GTS London Investigations	Yes						
Investigations	SwiftInvGTSLondon	Yes						
Investigations	Treasury AP Investigation	No	From Group	Personal Sent	Yes	Daily	Actioned Folder	No
Investigations	SwiftInvGTSLondon	Yes						
Investigations	GTS London Investigations	Yes						
Settlements	EX-MAN London	Yes	From Group	Personal Sent	Yes	Daily	ExMan Sent items folder	No
Settlements	FXCashPayments	Yes	From Group	Personal Sent	Yes		Group archive folder	No

A sample analysis of the group mailbox Incoming volumes study for the Confirmations team is shown in Table 30. Due to information security policy the detailed email analysis could not be included in this report.

Table 30: Group Mailbox Incoming Volumes Analysis - Confirmations

					Actioned Items			
Mailbox	Non Actioned (NA)	Total emails	% Actioned	% Not Actioned	Cced to APConfirmations	Cced to SGP LDN SHIFT CHASERS	Cced to SGP LDN SHIFT CHASERS	Cced to SGP LDN SHIFT CHASERS
APConfirmations	15	168	91.09%	8.91%	75	5	0	4
SGP LDN SHIFT CHAS	4	49	91.90%	8.10%	1	38	-	-
FX And MM Confirma	19	21	10.38%	89.62%	-	-	-	-
CLS INOUTSWOP	-	128	100.00%	0.00%	1	-	-	18
Total	38	367	89.64%	10.36%				

180	~ per day
Total Unactioned and Cced back to Internal Mailbox	
~ Effort per mail (min)	0.75
Total ~ effort wasted/day (min)	135

Effort for none actioned and back CCed emails

8.5.4 IntelliMATCH Manual Matching Gap

Manual matching and recoding are exceptions tasks done when the system does not reconcile statements debit and credits against ledger entries. These manual matches and recodes are on entries that should ideally have auto matched or been originally routed to the correct receiving department. A sample of entries manually matched and recoded was taken and an RCA performed to determine the reasons for non-auto matching. Results of the analysis of the manual matching for the Euro and GBP currency class are summarised in Table 31. Percentage ratios are a measure of the category portion within the total volumes of non-auto matched entries.

Table 31: IntelliMATCH Manual Matching Sample Analysis

Matching Rule	RTNS - EUR	*% Ratio*	RTNS - GBP	*% Ratio*	GLOBAL NOSTRO	*% Ratio*
On Ordering Inst	658	59.98%	318	62.11%	-	-
Related Ref	55	5.01%	36	7.03%	20	4.96%
Common ref	33	3.01%	31	6.05%	12	2.98%
CPCS	-	-	-	-	81	20.10%
FX REF	33	3.01%	41	8.01%	12	2.98%
Actual Total Volume	1097	71.01%	512	83.20%	403	31.02%

Figure 75 shows the fishbone diagram as an output of the RCA done on the IntelliMATCH manual matching and recoding gap.

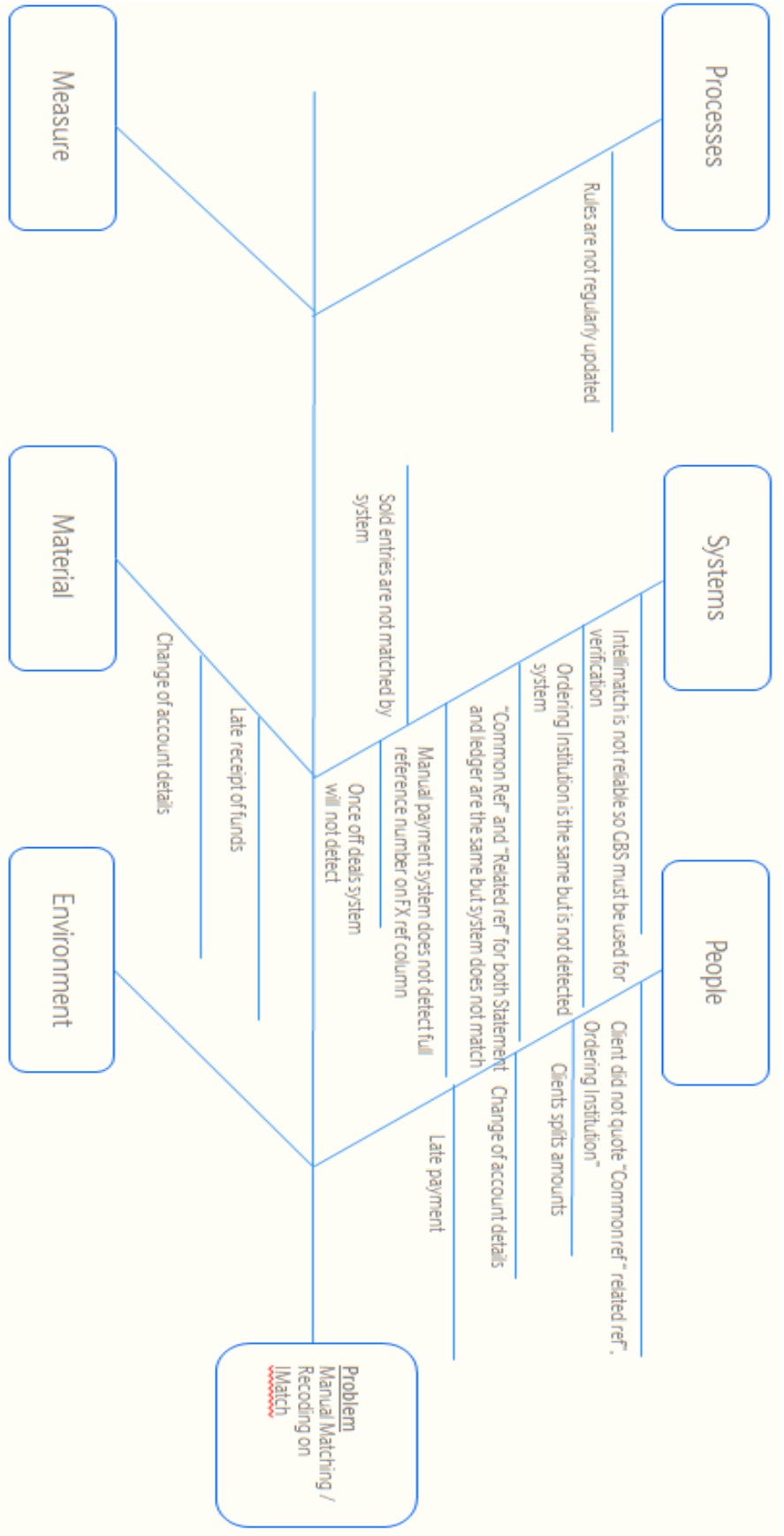


Figure 75: IMatch Manual Matching/Recoding Fishbone Diagram RCA

8.5.5 FMEA

An FMEA was done for all three gaps outlined above and is shown in Figure 76. Severity, occurrences and detection rankings are given for the indicated failure modes and effect. The work done in this phase allowed for the quantification and graphical analysis of the as-is state of the business in terms of the identified gaps. The following section showcases how the root cause analysis and FMEA enabled the generation and selection of ideas as possible countermeasures to the problems identified.

#	Process Function (Step)	Potential Failure Modes (process defects)	Potential Effect(s) of Failure	SEV	Potential Cause(s) of Failure	OCC	Current Process Controls	DET	RPN	Recommend Actions
1	Mailbox Management	Emails come into the wrong mailbox	Capacity lost on sorting emails for departmental relevance	7	Customers not educated on proper communication channels	10	Manual sorting of emails	7	490	Improve customer education
2	Mailbox Management	Emails copied to multiple mailboxes	Capacity lost on sorting emails for departmental relevance	7	Customers not educated on proper communication channels	10	Manual sorting of emails	7	490	Improve customer education
3	Mailbox Management	Sender includes point of escalation in all emails	Escalation framework is saturated	7	Customers not educated on proper communication channels	10	Manual sorting of emails	7	490	Improve customer education
4	Mailbox Management	No contact details for counterparties and traders	Increased volume of emails to track down contact details	7	No central contacts database for internal and external parties	10	Manual sourcing of contacts required	7	490	Build a central database of contacts
5	Mailbox Management	Mails wrongly routed/disregarded	Long TAT, unresolved queries, multiple follow ups	7	Manual indexing of emails	10	None	7	490	Implement workflow tool, auto indexing
6	Mailbox Management	Too many mailboxes	Unclear communication paths, duplicates	7	Ineffective mailbox structure	10	None	7	490	Rationalise number and naming convention
7	Mailbox Management	No volume data on emails processed	No effective way to manage capacity on mailbox management	7	No workflow tool implemented, MI report developed	10	Manual counting when required	7	490	Implement workflow tool, Develop MI reports
8	Systems	System Latency	lost capacity, long TAT on activities	7	Slow network speed	10	Call IT when experiencing latency	7	490	Explore IT options to improve system performance
9	Mailbox Management	Request for static detail changes received	lost capacity, long TAT on request	7	Customers not educated on proper communication channels	9	Forward to Static	7	441	Improve customer education
10	Mailbox Management	Long time taken on mailbox management	lost capacity, long TAT on request	5	System latency	10	None	7	350	Improve system performance
11	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Trades booked without SSI resulting in breaks	7	Online Trade (BARX – Onboarding team doesn't update SSI for most trades	8	Trades do not STP if SSI is incorrect or missing - Exception that go for manual processing	2	112	Mistake-proof the system such that no trades can be booked without SSI
12	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Trades booked without SSI resulting in breaks	7	Client defers/omits submitting SSI	8	Trades do not STP if SSI is incorrect or missing - Exception that go for manual processing	2	112	Ensure that missing/deferred SSIs are updated before booking trades
13	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Future trades for the same CP come back into the exceptions queue	7	PTS Joburg can not update static themselves and depend on GRD	8	Trades do not STP if SSI is incorrect or missing - Exception that go for manual processing	2	112	Give SSI update mandate to local resources
14	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Future trades for the same CP come back into the exceptions queue	7	Fragmented database (GRD, Alert, B-queries) - same error from separate sources	8	Trades do not STP if SSI is incorrect or missing - Exception that go for manual processing	2	112	Integrate SSI data bases
15	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Future trades for the same CP come back into the exceptions queue	7	Ops not fully trained on B-queries - not submitted or incorrectly filed	8	Trades do not STP if SSI is incorrect or missing - Exception that go for manual processing	2	112	Retrain PTS resources on Bquery
16	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Future trades for the same CP come back into the exceptions queue	7	Lack of knowledge at GRD causing non-resolution of B-queries	8	Trades do not STP if SSI is incorrect or missing - Exception that go for manual processing	2	112	Up skill GRD staff
17	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Future trades for the same CP come back into the exceptions queue	7	No escalation matrix	8	Trades do not STP if SSI is incorrect or missing - Exception that go for manual processing	2	112	Develop formal escalation framework for unresolved requests
18	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Future trades for the same CP come back into the exceptions queue	7	Lack of communication between GRD and Ops	8	Trades do not STP if SSI is incorrect or missing - Exception that go for manual processing	2	112	Improve communication framework between GRD and PTS Ops
19	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Future trades for the same CP come back into the exceptions queue	7	B-query impacts only one asset class data – Separate queries needs to be opened for other asset classes	8	Trades do not STP if SSI is incorrect or missing - Exception that go for manual processing	2	112	Ensure that SSI is updated for all asset classes when a Bquery is raised
20	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Trades booked without SSI resulting in breaks	7	'Give – up' Trades – GRD Doesn't update static for child CP in line with Parent	7	Trades do not STP if SSI is incorrect or missing - Exeption that go for manual processing	2	98	Update all child CP to match parent SSI
21	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Trades booked without SSI resulting in breaks	7	Alert (Not setting Alert codes by XXX team - XXX = To be identified)	7	Trades do not STP if SSI is incorrect or missing - Exeption that go for manual processing	2	98	Update all team codes for alert messages
22	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Trades booked without SSI resulting in breaks	7	GRD Doesn't update static data for all currencies	7	Trades do not STP if SSI is incorrect or missing - Exeption that go for manual processing	2	98	Ensure that SSIs are set up for all currencies
23	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Future trades for the same CP come back into the exceptions queue	7	Settlement Joburg doesn't always update Static after sourcing the SSI from client	7	Trades do not STP if SSI is incorrect or missing - Exeption that go for manual processing	2	98	Ensure that Bquery is raised for all SSI sourced
24	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Future trades for the same CP come back into the exceptions queue	7	Alert team disjointed from GRD	7	Trades do not STP if SSI is incorrect or missing - Exeption that go for manual processing	2	98	Join GRD and Alert team
25	Client Onboading / Trade Booking	Trades booked with incorrect/missing SSI	Future trades for the same CP come back into the exceptions queue	7	No one stop shop for forwarding customer related information (for updates)	7	Trades do not STP if SSI is incorrect or missing - Exeption that go for manual processing	2	98	centralise teams for all SSI related queries

Figure 76: FMEA

8.6 IMPROVE

The broad implementation of the DFX Process Transformation Project was aimed at introducing a Lean management system as a best practice implementation. The focus was also to identify and remediate any quick wins that could be addressed within the 16 week window of the implementation plan.

Highlighted below are the solutions to the gaps identified within the scope of the project. SSIs were a major gap identified with no significant action taken towards improvement due to the complexity of the solution set; a strategic recommendation was given to business to consider launching a separate project to address this gap.

8.6.1 Lean Management System

Implementation of a lean management system (LMS) was identified as a way of introducing best practice on the management front. Lean management is proven to address the gaps identified in the management framework. KPMG experience suggested 10 to 20% savings to be achievable through the implementation of Lean management. A conservative potential savings assumption of 7.5% was however used for the DFX Process Transformation project.

Lean management systems typically consist of around 25 components in operationally excellent environment. The 16 modules, highlighted in Table 32, were selected for implementation. Managing in this way not only produces benefits in terms of cost but also capability, control, customer experience, and staff engagement.

The four phase LMS implementation focussed on the Lean management core activities highlighted in Table 32 (KPMG, 2013). The LMS training schedule for the Johannesburg team is also shown in Table 33. Training and implementation for each activity had to be done before proceeding to the subsequent activity.

Table 32: LMS Implementation

Activity 1	Activity 2	Activity 3	Activity 4
Huddle Boards / Visual Management	SOPs	Demand Base lining	Root cause problem solving
Daily performance meeting	DILO/WILO	Capacity management	TIPs
KPIs	Coaching and feedback	Process Confirmation	Change story
Skills Matrix			VoC

The implementation entailed delivering phased LMS training to the SMEs and then immediately implementing the initiative as shown in the overview in Figure 77. Training materials were provided by *KPMG UK* and delivered to the local project lead before transferring to the SMEs. The discussion below is an overview of the major elements of the chosen tools for implementation.

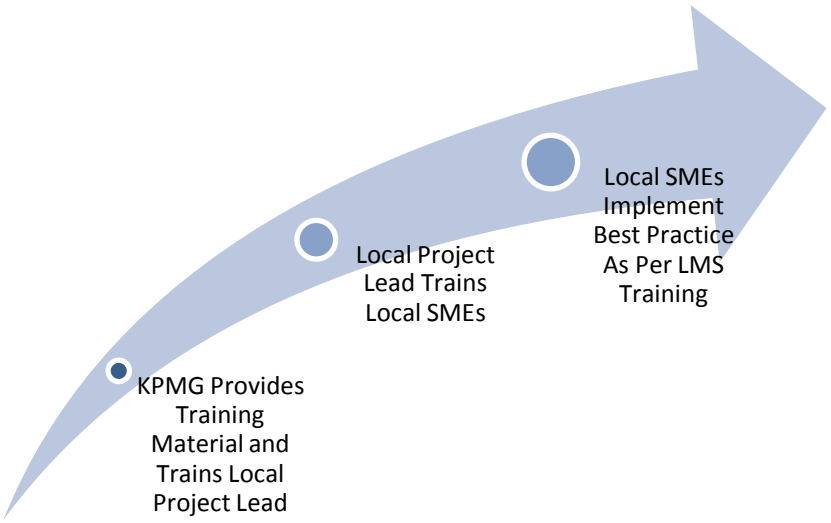


Figure 77: LMS Implementation Phase Overview

Table 33: LMS Training Schedule

Training Module	Date	Duration (Hrs)	Trainer	Attendees	Key lessons	Key actions
A1 – Lean Management System	27/03/2014	2.5	Piyush	Marvel, Roy-Confirmations, Amara-Investigations, Tony-Settlements	• KPIs • Huddle boards/Visual Management • Skills Matrix	Set up huddle boards Agree KPIs Set up skills matrix Set up formal Daily Huddles
A2 - Standardised work and process confirmation	16/04/2014	2	Marvel	Roy-Confirmations, Amara-Investigations, Tony-Settlements	• Illustrated importance of standard work • Provided principles of use of SOPs • Provided roll out mechanisms for SOPs • Highlight the need for process confirmation • Illustrate how PC enables continuous process improvement	Collect all SOPs for review Align Skills Matrices to SOPs
A3 - Demand base lining and capacity management	25/04/2014	1	Marvel	Roy-Confirmations, Amara-Investigations, Tony-Settlements	• Demonstrate how capacity management can be used to identify time for training and coaching • Demonstrate how multi-skilling teams leads to a reduction in overworking • Understand the impact of failing to forecast demand • Understand the essentials of forecasting volumes • Understand some key strategies for coping with changing demand	Complete/signoff capacity analysis Track capacity on a day to day basis Establish BAU reports to track trends Display trends on huddle boards
A4 - Change Story and TIP	5/05/2014	1	Marvel	Roy-Confirmations, Amara-Investigations, Tony-Settlements, Steven-Jhb DFX Ops	• Create a compelling change story within the context of the DFX Process transformation Project • Create/maintain TIPs for all DFX Process Transformation project related actions	Create a compelling change story within the context of the DFX Process transformation Project Create TIPs for all DFX Process Transformation project related actions Maintain TIPs for all DFX Process Transformation project related actions after GBT handover

A Huddle board is a tool that provides clarity & transparency on the past and present performance and engagement of the team. Figure 78 (KPMG, 2013) shows a mock-up of the huddle board developed for the Johannesburg DFX Operations teams. Appendices B to D show the huddle boards and huddles for the teams. Skills matrices were also established across the 3 teams as a way of tracking the skills spread and development gaps within and across the teams.

The LMS implementation also instituted the need for setting up formal SOPs across the team's process landscape. Training was delivered to the SMEs and the setting up of SOPs deferred to a separate project work stream as a full implementation was not possible within the timeframe of the DFX Process Transformation project.

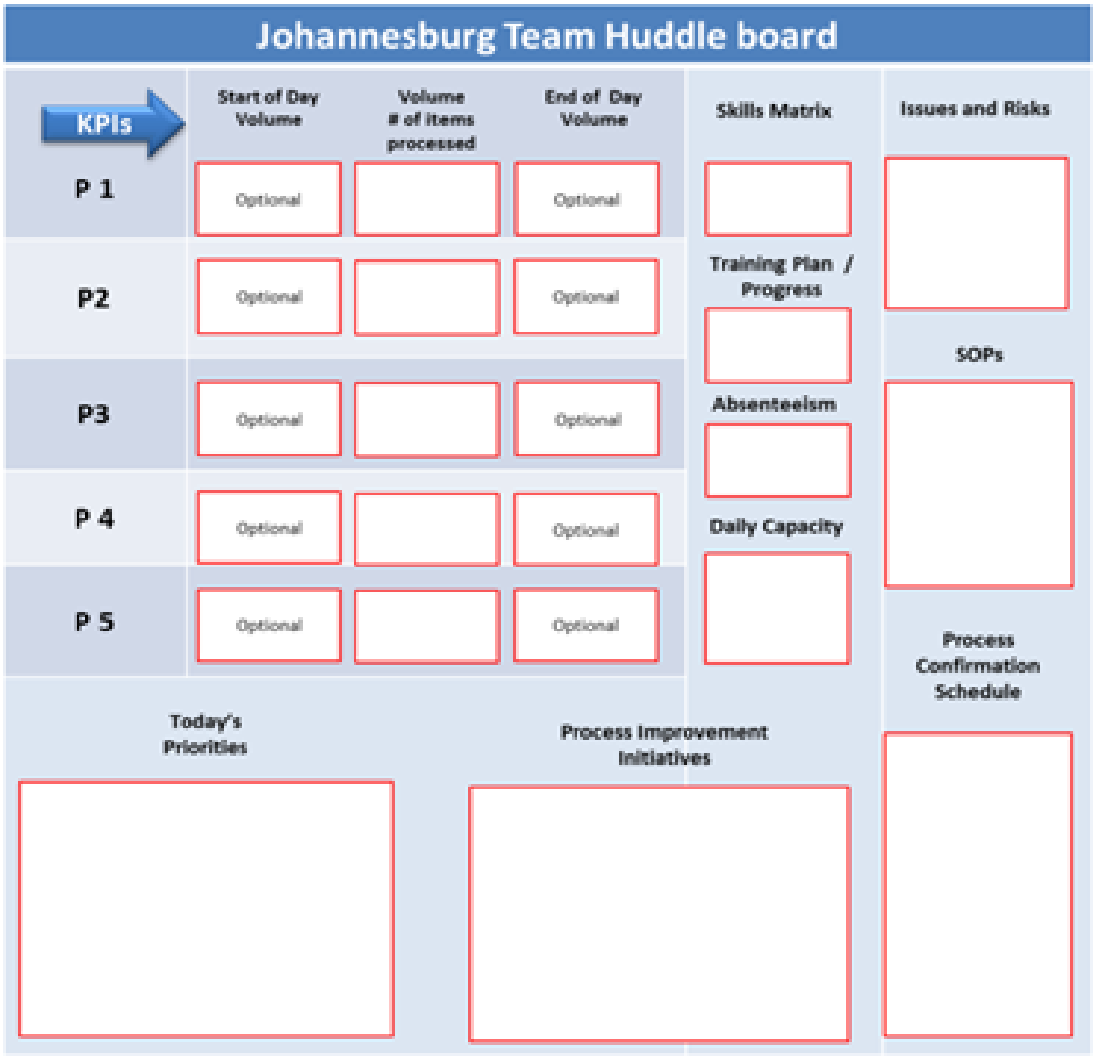


Figure 78: Johannesburg DFX Operations Huddle Board Mock-Up

Process confirmation was also recommended for implementation as part of the LMS. Process Confirmation (PC) is the standardised way by which managers 'go and see' that their teams are able to follow the standard operating procedure by sitting with them and asking them to follow the SOPs, understand and act on the root causes of any issues. PC is a way of documenting adherence to standards, facilitate coaching and validate actions with staff. The process confirmation work was scheduled to begin once the project to compile all SOPs is completed.

Daily capacity management was implemented as a way of proactively identifying demand versus resources available in order to take decisive action to meet requirements and also free up excess capacity for training and coaching. Capacity management also leads to better utilisation of a flexible work team as developed via the skills matrix and cross training plan.

Capacity management works by looking for trends in periodic demand to allow for enhanced forecasting and eventually active data driven workforce capacity management. As a prerequisite to having effective capacity management the flexible workforce needs to be developed. To implement flexibility it is important to have the ability to react to changes in customer demand thus understanding the skills mix is a key success factor.

A standard supply assumption model was developed for the Johannesburg team in order to determine the average capacity available per FTE per day. The model, shown in Table 34, indicated that shrinkage from 8.5 to 5.02 hours per day was to be expected. This shrinkage needs to be taken into consideration during the capacity management process.

Table 34: Standard Supply Assumption Model

	Standard Supply Assumption			
SL #	Supply Variables	Value	Unit	Remarks
A	Average Possible Work Days per month	21.75	Days	Total Working Days in a year minus weekends (356 - 104)
B	Average Benefit Time Shrinkage Days per Month	5.20	Days	MBL (average 25.5) + Vacation + Sick Leaves (30) + National Holidays (7)
C	Average Training Shrinkage Days per Month	0.50	Days	6 Days of Training per year covering all non process / functional Training
D	Average Net Work Days per Month	16.05	Days	A – B- C
E	Monthly Staff Hours per Analyst	136.43	Hours	8.5 Hours per day multiplied by D
F	Lunch / Dinner + Comfort / Bio Breaks	16.05	Hours	60 Mins per Day
G	Daily Team Huddles	4.01	Hours	15 Mins Daily Huddle on Team Perf & Process Updates
H	System Down Time		Hours	Not considered as part of Shrinkage
I	Weekly Team Meeting	2.00	Hours	30 Mins every week with Team; 2 Hrs every month
J	Monthly 1 X 1	1.00	Hour	1 Hour per Analyst on a monthly basis
K	Performance Management	1.50	Hour	Every 6 Months (3 hours for Analysts for preparation; 4 Hours for Line Manager 1 X 1; 1 hour for Director Level Final Rating Communication; 30 Mins for Goal communication and 30 Mins for upload (1 Hour); Annually 6 Hours per person
L	Monthly Town Halls	1.00	Hour	One hour every month
M	Skip Level Meet	0.33	Hour	1 Hour per Analyst on a quarterly basis
N	Compliance Training	1.25	Hour	15hrs per person per year
O	Fire Drill , Associate Sat Survey, Other support surveys, Feedback	0.17	Hour	30 Mins every quarter; Annualized 2 Hours
P	Net Productivity	109.11	Hours	This has been rounded to 140 Hours a Month (E – (Sum (F : O))
Q	Productivity Hours per Day @ 16.05 Days	6.80	Hours	
R	Productivity Hours per Day @ 21.75 Days	5.02	Hours	
S	Paid Hours	8.50	Hours	

All 16 of the chosen lean management tools were implemented with some discretionary input from the local management in cases where certain aspects of a tool were not considered to be fit for purpose.

8.6.2 Mailbox Management

Mailbox management activities, including indexing and filing, non-value adding activities from customer perspective, were measured and analysed during the Insight/Analyse phase value stream map work shop sessions and subsequent DILO and sampling exercises. The manual task of managing Incoming emails is required in order to filter the contents of the email inbox according to department/asset class relevance and analyst required for the type of query

The IB Operations team spends a significant portion of their total capacity on mailbox management. Approximately 15 mailboxes were shared between the 3 teams in IB Ops Johannesburg. The solution to the problem included the following:

- Determine rationalised number of mailboxes required;
- Design naming conventions for rationalised mailboxes;
- Design autoreplies for the mailboxes;
- Propose standard subject line content to enhance auto indexing;
- Implement auto indexing rules.

The results of the mailbox rationalisation engagement are shown in Figure 79. Four mailboxes have been merged in Settlements, two were flagged for merging in Investigations but the new naming convention had not been decided as yet by the time of writing this report. No changes were required for the mailboxes in Settlements team.

	Old Mailbox Name	New Mailbox Names
Confirmations	APConfirmations	globalFXcashconfirmations
	CLS INOUTSWOP	Confirmations - recs emails*
	SGP LDN SHIFT CHASERS	London FX Fax Scanning*
	FX And MM Confirmations	SGP LDN Shift Queries*
	London FX Fax Scanning*	Treasury Fax Confirmations*
	Confirmations - recs emails*	
	SGP LDN Shift Queries*	
	Treasury Fax Confirmations*	

	Old Mailbox Name	New Mailbox Names
Investigations	Treasury AP Investigation	TBD
	GTS London Investigations	GLA GTS Authorisations*
	SwiftInvGTSLondon*	SwiftInvGTSLondon*
	GLA GTS Authorisations*	

	Old Mailbox Name	New Mailbox Names
Settlements	EX-Man*	No Changes
	FXCashPayments	
	NDF Settlements	

* Mailbox only reserved for internal communication hence out of scope

Figure 79: Mailbox Rationalisation

The overall process flow for this solution is shown in Figure 80 .

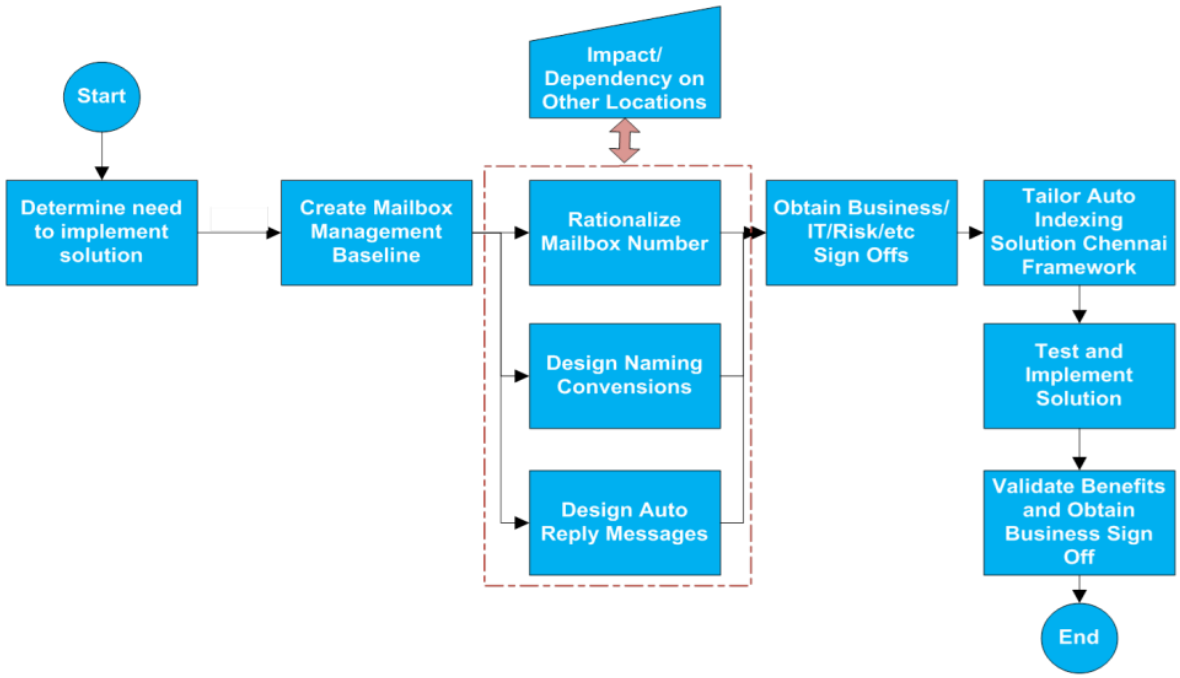


Figure 80: Mailbox Management Solution Process

The expected benefits of this implementation include:

- Reduce capacity spent on mailbox management by reducing the manual indexing/filing required by 0.75 FTE;
- Approximately 60% of bad volume can be reduced by implementing auto rule for moving carbon copied items to certain folder/s;
- Further benefits from rationalization, new naming conventions and informative autoreplies can only be validated against established baseline upon implementation.

The solution for auto allocation of emails was designed out of the Chennai office and transferred to the rest of the locations. The solution entailed using VB macros to automatically look for key words in an email to allow for routing to a specific folder for processing.

8.6.3 Manual Matching of Funds/Recoding

Manual matching is performed when entries do not match automatically when they should have. Recoding happens since transactions are coded to wrong departments. Primary reasons for manual work are that matching rules are not up to date and the system does not code to correct environment when some trades are booked. Johannesburg Investigations team spent ~14% of total capacity on manual matching/recoding.

The solution aims to reduce the volume of manual matching and recoding done. The approach taken was to establish and quantify the reasons for manual matching and recoding and then submit update requests to remediate accordingly. This implementation will reduce the amount of time spent on manual matching of funds/recoding by improving the STP rate and correctly coding transactions to their appropriate environments. The overall process flow for the improvement exercise is illustrated in Figure 81.

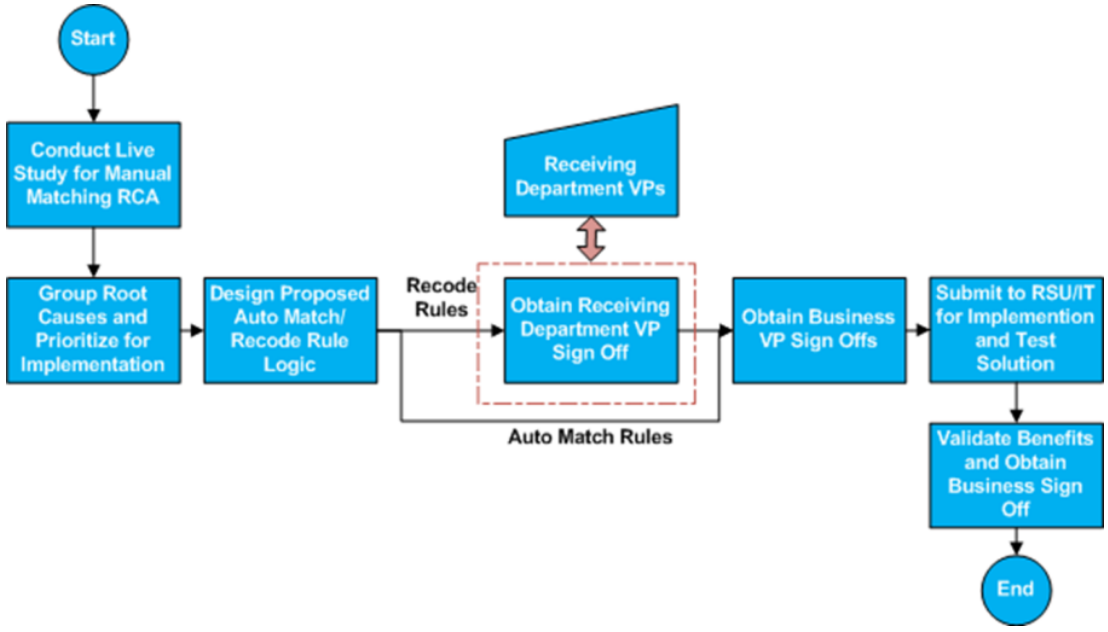


Figure 81: Auto Match/Recode Rules Solution Overview

8.6.4 System Latency

Data showed that the Johannesburg team regularly experienced system latency to which a daily capacity equivalent to 30 minutes per agent is lost on average. IT resources were deployed to conduct an RCA for latency and also investigate if relocation to the main office location would resolve the issue. The capacity analysis showed that resolution of the system latency problem had a potential saving of 3.0 FTE in total.

The implementation of the proposed actions was handed over to the IT department since the subject matter expertise to analyse and address the problems did not exist in the core project team. A broad overview of the actions required to analyse and remediate system latency is shown in Table 35.

Table 35: System Latency Action Overview

Important Step (What)	Key Points (How)	Reasons (Why)
An IT resource to be deployed to do the RCA for latency	IT to be engaged	The RCA requires technical expertise which does not lie with Business SME's
Complete the RCA to understand root cause	Testing of VDI's environments	Technical reasons behind the latency need to be determined
Determine if movement to a new location would fix the issue	IT to compare the technical and network set-up in different locations	Benefit realization and validation

8.6.5 Conclusion

The solutions outlined above were implemented to affect the desired reduction in FTE requirements. Figure 82 shows the trend in volumes for NDF and FX trades flowing through the trade system. While this snap shot may indicate that volumes are tending to drop this may be due to a seasonal or cyclical pattern that is not yet apparent from the sample. Experience shows that the overall trade volumes remain flat at a long term average of 250 000 trades per day.

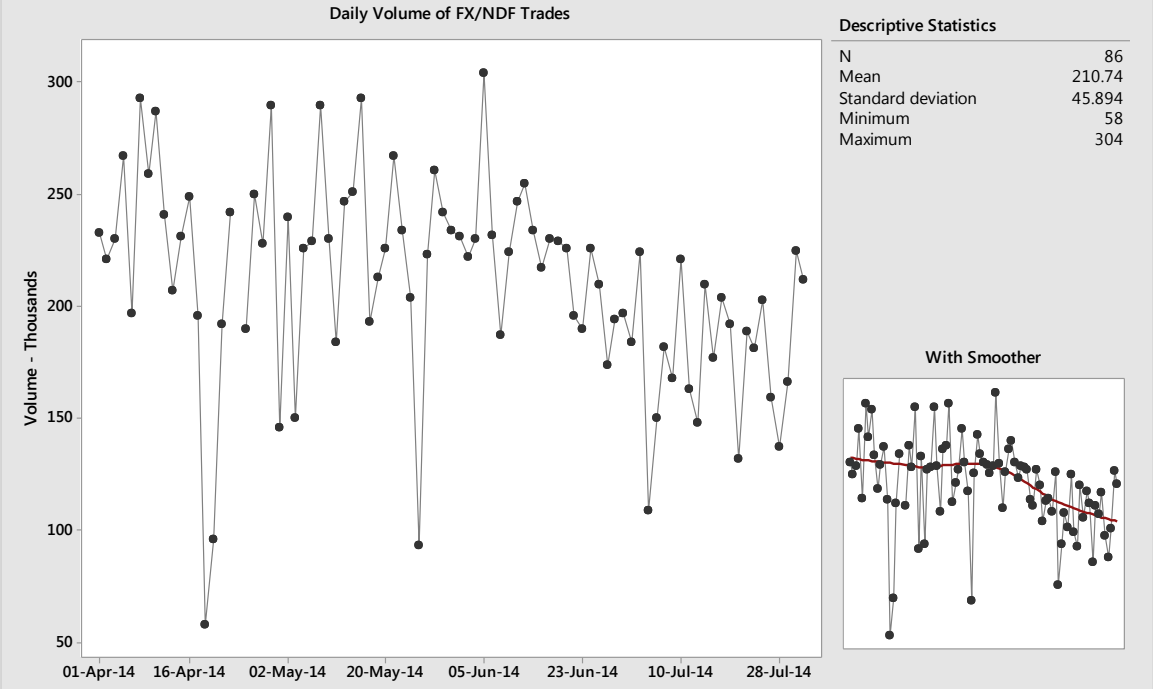


Figure 82: Daily Volume of FX/NDF Trades

Now the only data available at writing that is indicative of process capability was for the settlements team. The TBA forward queue end of day figure is an indicator of the team effort to clear the queue. A direct trend comparison with the volume trend was therefore possible. Figure 88 shows the time series plot for TBA forward queue end of day volumes for the Settlements team. A first impression of the data plot suggests a general reduction in the EOD volumes with time.

Experience suggests that the data should exhibit mostly seasonal or cyclical patterns; this usually requires that we have at least 3 to 5 seasons or cycles. The data presented below is inadequate for us to determine whether the seasonal pattern is stable or the cycles are regular. The analysis is therefore predictive pending the availability of a better quality data set.

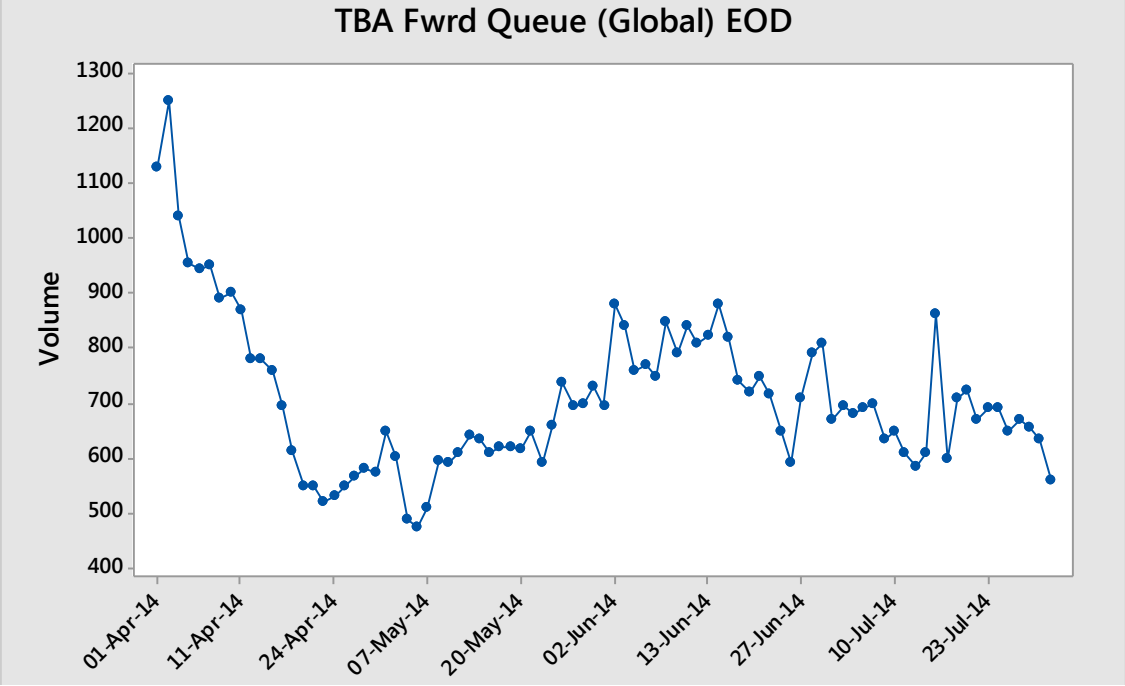


Figure 83: TBA Forward Queue EOD Volumes

Since the majority of the proposed changes included IT interventions, and thus were not yet fully implemented at the time of writing, the only change this work attempts to analyse for is the impact of the Lean management system. The data above is grouped on the engagement of the GBT and KPMG resources at the project site which ended at the end of May 2014.

Figure 84 shows the TBA queue data grouped as described above with normality test results shown in Figure 85 and Figure 86. A comparison of the samples to determine differences in variance was also conducted and the results are illustrated in Figure 87. The test shows that we can conclude that the standard deviations differ at the 0.05 level of significance; as shown by the red interval on the comparison chart. There is need for us to consider the size of the difference to determine if it has practical implications before we can draw conclusions. Again this consideration can only be done when a larger sample size becomes available.

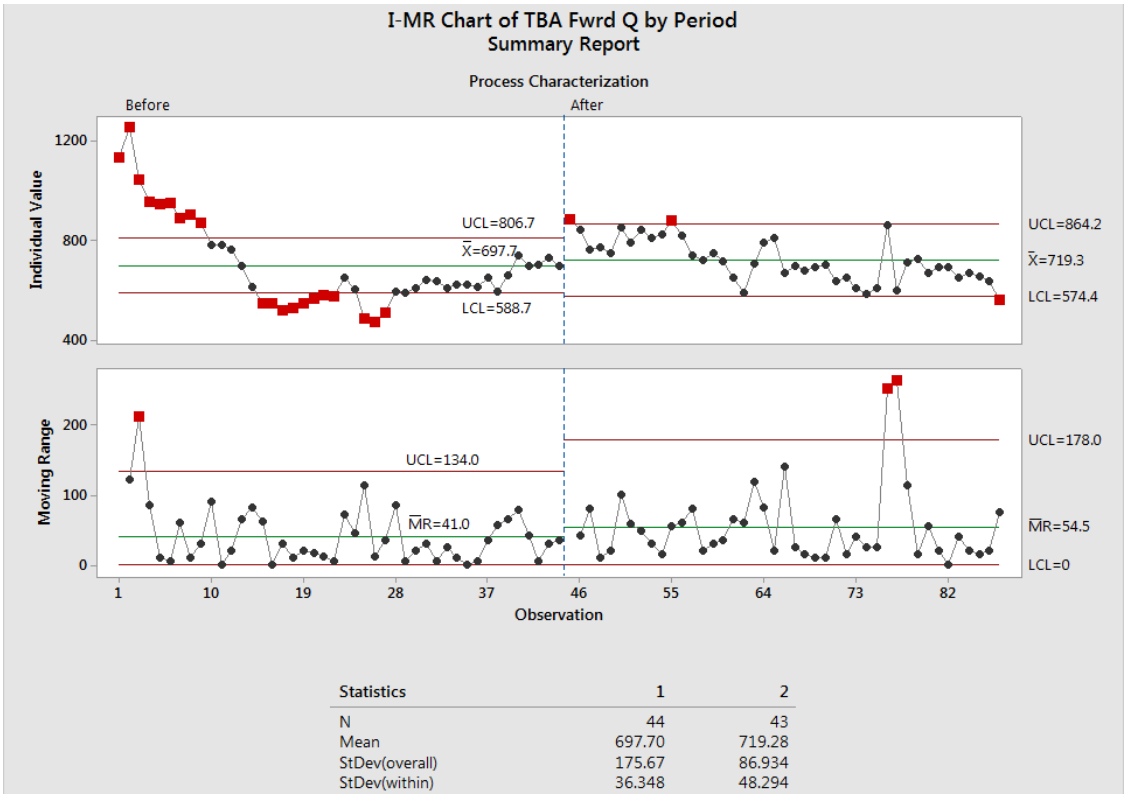


Figure 84: I-MR Chart of TBA Fwrd Queue Before and After

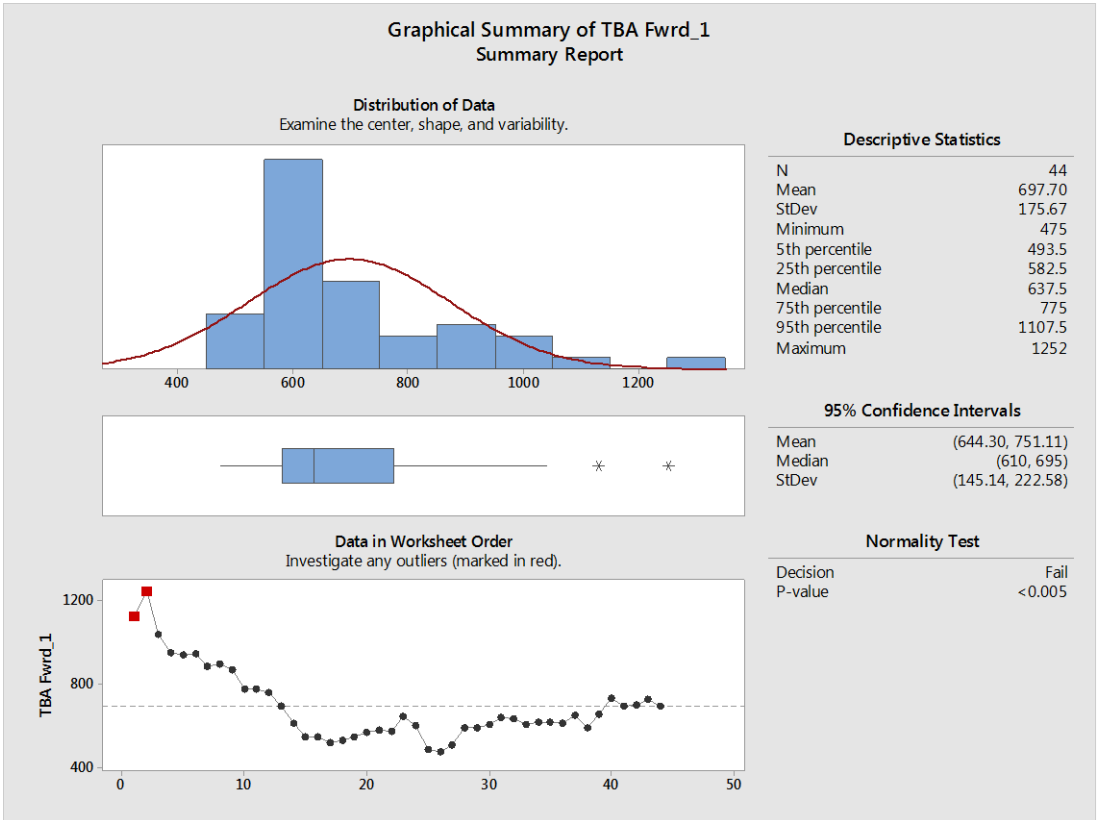


Figure 85: Graphical Summary - TBA Fwrd_1

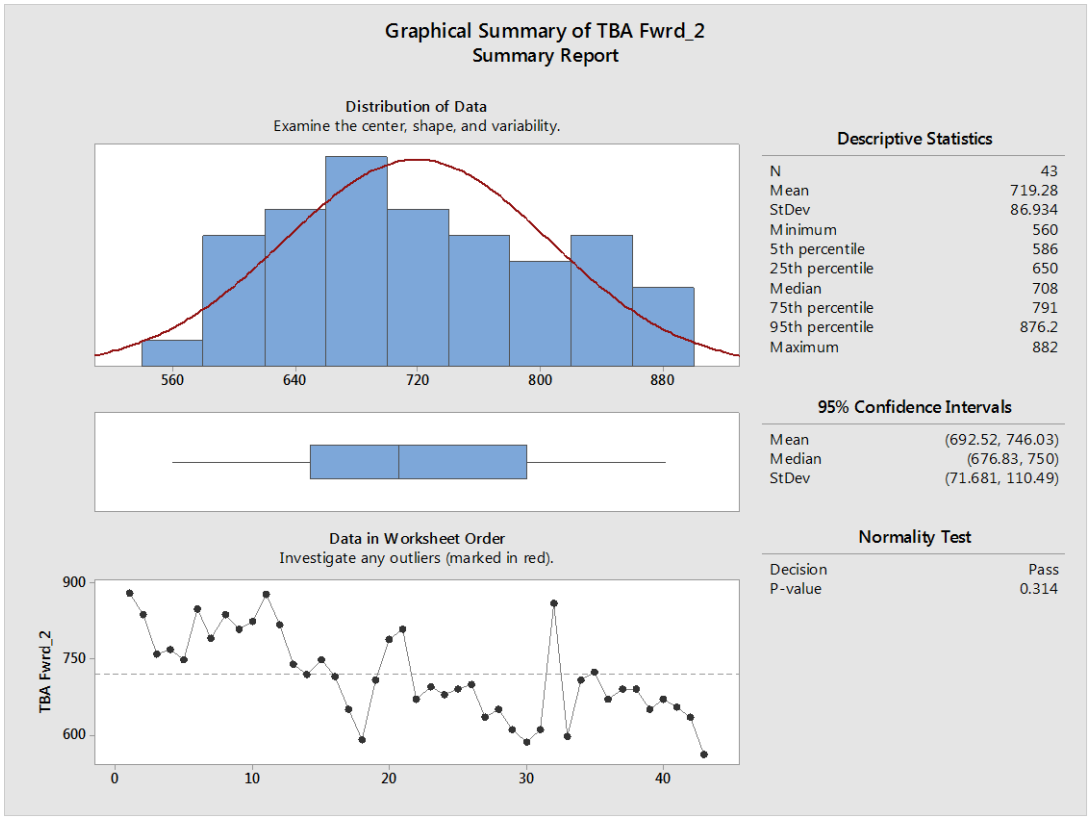


Figure 86: Graphical Summary - TBA Fwrd_2

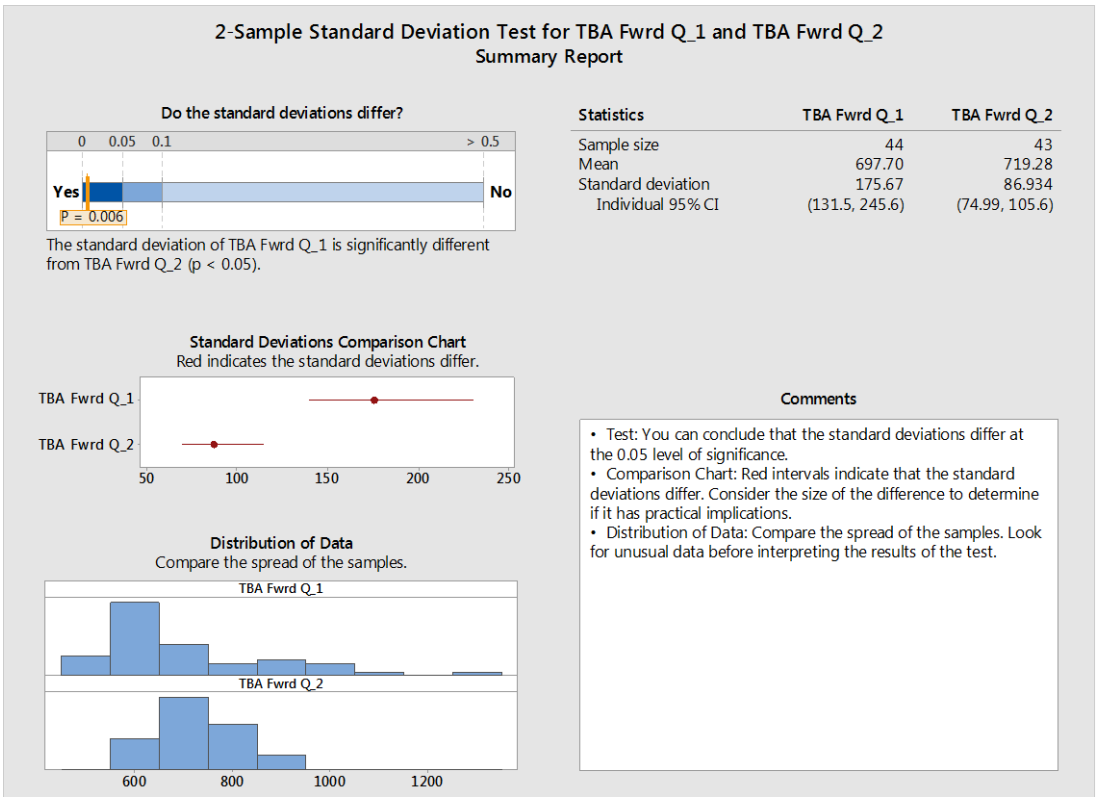


Figure 87: 2-Sample Standard Deviation Test Summary Report

Since the analysis shows that the data as not normal and variances not equal in the "before" period we therefore take a cautious approach in ascertaining if there was any statistically significant difference in the medians of the data in these two periods. This analysis is done taking cognisance of the fact that there is a compound effect of the Lean management system changes and the active engagement of the project resources on the ground. Figure 88 shows the diagnostic report for the Mann-Whitney Test done to test for a difference of medians between the two data groups; the results of the analysis show that, at a P-value of 0.0383, the medians are statistically significant. Due to the lack of normality and equal variance this result has to be handled with caution; a more conclusive analysis is therefore recommended when an adequate amount of data is needed to determine whether changes across stages are lasting and are not due to short-term abnormalities in the data. The data before end May date however fails the normality test. Power and sample size estimates can only be made when a larger sample size is available for analysis.

Mann-Whitney Test and CI: TBA Fwrd - Before, TBA Fwrd - After

	N	Median
TBA Fwrd - Before	44	637.50
TBA Fwrd - After	43	708.00

Point estimate for η1 - η2 is -60.00
95.1 Percent CI for η1 - η2 is (-102.02,-4.00)
W = 1691.5
Test of η1 = η2 vs η1 ≠ η2 is significant at 0.0383
The test is significant at 0.0383 (adjusted for ties)

Figure 88: Mann-Whitney Test and CI for TBA Fwrd Queue

The need to investigate for apparent outliers is also highlighted in the analysis, some points do not appear to belong with the rest of the data and can strongly influence the results of any statistical analysis performed. Due

to the reliance on manually collected data it was not possible to identify the cause of their unusual nature. Despite the apparent downward trend of the one KPI analysed above it is another analysis is recommended once system data becomes available as per implementation plan.

A graphical comparison of the "Before" and "After" data also shows that while the process has stabilised after the changes there were markedly more variation in the trend as evidenced by the wide control X_{bar} and MR_{bar} bands in Figure 84. This could be attributed to the normalisation required when a process change is implemented in a system. Analysis of longer term data will allow for a more stabilised view of the process.

Analysis of the other data available from the team did not yield any statistically significant results. The full data set available for the Settlements and Investigation team at the time of writing is shown in the files labelled "Settlements KPI Data" and "Investigations KPI Data" respectively. No data was available for analysis for the Confirmations team.

8.7 CONTROL

The DFX Process Transformation project came to a formal close at the end of May 2014. Certain actions were indeed still under implementation and as such the benefits would be realised outside the 16 week window of the project. A handover plan was crafted in the form of a Tactical Implementation Plan to transfer action ownership fully to the SMEs for all outstanding actions. The control plan for the project after handover is summarised in Table 36.

The benefits realisation date for all the initiatives was end of October 2014. The financial benefit of the project will be the FTE saving multiplied by the average cost per analyst. The expected benefits are 12 FTE which translates to R3.6M.

An executive decision was however made in the second week of July 2014 to migrate the DFX Operations process family to Mumbai India by the end of December 2014. This move was made in an effort to consolidate the process estate for Barclays Capital as ~70% of the business offshored work already resided in India. The benefits to be realised from the efforts of this project are expected to remain the same.

Table 36: Control Plan

No	Solution	What is Controlled?	Input / Output?	Measurement Method	Control Activity	Sample Size	Frequency	Requirements	Corrective Action	Responsible
1	Mailbox Management	Auto indexing rules	Input	Manual sampling	Auto indexing rules review – analyse day to day trends in incoming mails to identify opportunities enhancements to auto indexing rules	Monthly data sample	BAU	Sample/Record of residual manual indexing done	Submit request to implement rules on recurring trends	SMEs – DFX Ops (Amara, Roy, Tony)
2	Mailbox Management	Mailbox structure	Input	Management Review	Mailbox Rationalisation review – review the mailbox structure to determine if still fit for purpose	-	Annual	Inventory of current mailboxes and volumes handled	rationalise where numbers can be reduced	SMEs – DFX Ops (Amara, Roy, Tony)
3	System Latency	System performance	Output	Manual sampling	Annual review – Business to engage with IT to assess network efficiency and identify any opportunities for enhancement	weekly data sample	Annual	RCA on any latency still experienced	engage with IT do design solution to any existing problems	AVP – DFX Ops (Robyn)
4	IntelliMATCH Rules	Auto match rules	Input	Manual sampling	Annual Review – RCA to determine matching/recoding rules for review/implementation	-	Annual	Sample/Record of matching done	Submit request to implement rules on recurring trends	SME – Confirmation (Amara)
5	IntelliMATCH Rules	Auto match rules	Input	Manual sampling	Review day to day trends in manual matching/recoding to identify rules for quick implementation	weekly data sample	BAU	Sample/Record of matching done	Submit request to implement rules on recurring trends	SME – Confirmation (Amara)
6	KPI Tracking	KPI tracking	Output	Manual Data Collection	Capture KPI data data	Full sample	Daily	BAU data availability, KPI tracking template	Ensure that data records are maintained daily	SMEs – DFX Ops (Amara, Roy, Tony)
7	Capacity Management	Capacity requirement	Input	Manual Data Collection	Use volume data to track and analyse volume-capacity trends	Full sample	Daily, weekly	BAU data availability, Capacity planning and tracking tool	Ensure that data records are maintained daily	SMEs – DFX Ops (Amara, Roy, Tony)
8	Visual Management	Visual Management	Output	Manual sampling	Ensure Huddle Boards are updated and maintained	Full KPI data display	Daily	BAU data availability	Ensure that data records are maintained daily	SMEs – DFX Ops (Amara, Roy, Tony)
9	Daily Huddles	Team Engagement	Input	Attendance and occurance record	Ensure Daily huddles are done daily as per plan	Full sample	Daily	BAU data availability	Ensure that data records are maintained daily	SMEs – DFX Ops (Amara, Roy, Tony)
10	Huddle – Process Confirmation	Huddle process	Output	Manual effectiveness test	Conduct health checks to ensure huddles are being run effectively	Full sample	Weekly	Daily Huddles occurring	Align to standard where deviations are identified	SMEs – DFX Ops (Amara, Roy, Tony)
11	SOPs	procedures	Input	Manual Review	SOP review – to ensure SOPs are accurate and up to date	Full sample	As per risk rating	SOPs	Align to standard where deviations are identified	SMEs – DFX Ops (Amara, Roy, Tony)
12	SOP - Process Confirmation	procedure adherance	Output	Manual effectiveness test	Review against standard to ensure the standard processes in place are being followed and continually improved	Full sample	weekly	SOPs	Align to standard where deviations are identified	SMEs – DFX Ops (Amara, Roy, Tony)
13	Skills Matrix/Cross Skilling	Skill mix	Input	Manual Tracking	Ensure skills matrices are updated and maintained as per training plan progress	Full sample	BAU	Skills List, Up to data Staff List, training plan	Add new staff, remove leavers, update as per progress on training plan	SMEs – DFX Ops (Amara, Roy, Tony)
14	Management Huddles	management engagement	Input	Attendance and occurance record	Ensure Management huddles are conducted according to the prescribed agenda and frequency	Full sample	Weekly	BAU data availability	Ensure that data records are maintained weekly	Management DFX (Steve, Robyn, Amara, Tony Roy)
15	Design Authority	solution transfer	Output	Attendance and occurance record	Attend all design authority calls for solution tranfer across geographies	Full sample	As per DA schedule	defined solutions, applicability in receiving location	ensure design authority packs are circulated before the DA calls	Soulution Leads - all locations

8.8 PROJECT CONCLUSION

The project implementation followed the *KPMG* 16 week Lean implementation framework. The project team applied the tools and techniques of Lean to define and analyse the "current state" of the DFX operations team. Value stream assessments allowed for the identification of major gaps in performance and also for quick win opportunities. RCPS was used as the main tool for clarifying gaps and then developing appropriate remediation solutions.

The LMS implemented will allow for a sustained refinement of the operations in the team due to the wide scope of the tools implemented. Commitment will be required for the team to sustain the solutions implemented and realise the full benefits beyond the end of October 2014.

The executive decision to move the Johannesburg based DFX Operations processes to Mumbai by the end of 2014 is not expected to have an impact on the expected savings. Solutions were shared across locations and the receiving site will be adopting all solutions as implemented at the original site.

CHAPTER 9

SERVICE OPERATIONS MANAGEMENT DECISION SUPPORT

9.1 INTRODUCTION

Processes optimised via Lean Six Sigma or otherwise inherently need to be managed effectively on a day to day basis in order to glean maximum benefit. It is with this in mind that the author developed and proposed to the business a conceptual decision support tool highlighted in this chapter. The business has implemented an operations active capacity management system in many of its processing areas. There is however no modelling employed to ensure that managers use the system to the best of its potential. Reliance is placed on managers remembering guidelines from the simulation training and on the job experience thereafter. It is the author's proposition that a workforce allocation optimisation tool will ease the burden of rigorous manual workforce allocation and also maximise the performance of a processing team.

Most bank processing (back office) operations usually handle several types of processing requirements distinguished, for example, by the product class or the level of skill necessary to deliver technical input. It is usually

considered not possible or cost-effective to train every office administrator to be able to handle every processing requirement. Therefore the most common setup is a multi-skill back office operation; with various product/processing classes and also various administrator types, usually defined according to their skill set, i.e., the subset of processing demands they can handle. Skill-Based Routing (SBR), or simply routing, refers to the rules that control the demand-to-agent and agent-to-demand assignments. Most modern office operations, including for example bank processing centres and call centres, perform SBR (Akhtar & Latif, 2010; Avramidis, Chan, & L'Ecuyer, 2009; Koole & Mandelbaum, 2002).

Back office managers routinely impose constraints on the processing centre's performance. A commonly encountered performance measure is the Service Level (SL), usually defined as the long-term fraction of work units whose waiting time is no larger than a given constant (set via a Service Level Agreement (SLA)). Processing centre planners face the problems of determining appropriate staffing levels and agent work schedules. In the typical staffing problem, a working day is sectioned into periods and one merely decides the staff level of each administrator type for each time slot. However, in a scheduling problem, a set of acceptable work schedules is first defined, and the decision variables become the number of administrators of each skill type in each work schedule. This methodology determines the staffing implicitly, while ensuring that it matches up to a practical set of work schedules.

Wallace and Whitt (Wallace & Whitt, 2005) give insights, based on a different but comparable system, on the coordination of skill set design, staffing, and routing decisions for multi-skill service centres. Firstly, equipping agents with two skills and deploying a routing that balances agents' priorities over different demand classes, they obtain SLs that are effectively equivalent to that of a system where all agents have all skills. It is therefore apparent that if such a routing strategy is feasible, then training agents to have more than two skills will add negligible value to performance. Second, taking control of agent skill sets, staffing counts and routing, Wallace and White meet, but do not exceed, nearly exactly target SLs set for each call class.

Taking a similar approach we consider our bank back-office operation single-period staffing problem where the agent skill sets and best practise routing rules are given. Given the nature of the case study enterprise and office back office operations design the routing policies considered are of the (static) overflow routing family. In this deployment each process class has a rank ordered list of agent types that can handle it; upon arrival on the system, a processing pack of that class is assigned to the first agent type in this list that has an available person, or else is placed in queue. There is usually one queue per processing demand class. Similarly, each agent type has an ordered list of processing demand queues from which to pick up work when it becomes available.

The main optimisation problem is therefore to minimize staffing costs, globally and per processing class, subject to a set of constraints on SLs, assuming the processing centre is in steady-state operation. The SL

constraints are quite important to the case study bank because of recent governmental inquiries regarding the number and frequency of clients going into account lock up.

While being restrictive static routing rules are necessitated by the nature of the business design overall process and system designs. Ways to make the system more flexible should therefore be explored since, in general, lower costs can be achieved by relaxing the routing rules and optimizing the skill set vectors. Single-period staffing is highlighted as a component of several assignment, allocation and scheduling algorithms (Gomar, Haas, & Morton, 2002).

The purpose of this work was the development of an optimisation model for an established simulation training environment. Further to this is the focus on using a metaheuristics based algorithm as the analysis engine behind the decision support utility for the business game. The work aims to highlight the versatility of using metaheuristics, optimisation modelling and decision support tools in the AOMi® Simulation Training operations management simulation scenario and also indeed in the real world environment.

9.2 AOMi® Simulation Training Business Game

The AOMi® Simulation Training environment emulates a New York based bank Payments Unit. The simulation runs through a period of four months in the four day training course. The challenge in the business simulation is to turn around the performance of the Payments Unit pilot operation within the allotted time and win “a permanent contract” with the bank. The team

mission is therefore to manage the Payment Unit's transition period and deliver a profit. All material on this business game is referenced from material received during the actual training and also from corporate literature (AOMi LLC, 2013).

9.2.1 Operational Summary

The payments unit is a relatively small, straightforward payments section that processes just less than 30000 transactions per year. The business is offered on the basis of a payment of $4.00 per transaction, provided the service and quality SLAs are met. Expectation has set a margin return of at least 25% giving a potential of around $300,000 pa from the pilot period alone. Volumes can also be grown by up to 10% pa.

Figure 89 illustrates the single sequential 5 stage payments process. Each stage has different average processing rates and workforce skills demands. An additional parallel Quality Section fulfils two additional processes: auditing (Quality Control) and complaints handling

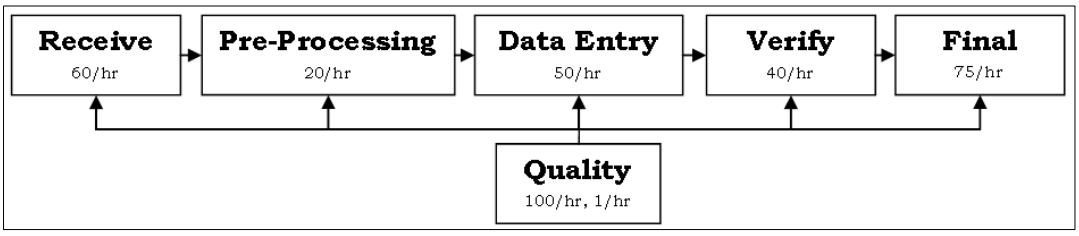


Figure 89: AOMi® Simulation Business Process

9.2.2 Staffing

Participants of the simulation training form the Operations Management of the team below which are three levels:

Supervisors (S) perform no production work but carry out the Operations Management's instructions and oversee the day-to-day work of the workforce. They rely on their abilities in Production Management (PR), People Skills (PS) and Communication Skills (CS). Sections may have more than one supervisor at a time. Each supervisor can cope with up to 9 people depending on their skill levels. An additional provision of Acting Supervisor (ASP) is also available which can be used as a probationary post when training someone into the role.

Work Leaders (WL) handle the day to day distribution of work and routine administration. They therefore set aside 1 hour of administrative work to remain with 7 hours for production tasks. Work leaders can manage a sub-team of up to 4 staff. If they have more than 4 then their production declines. A team with no Work Leader will suffer a 25% decline in productivity.

Full (FT) and Part time (PT) staff; these work on a full time contract and will work five day a week for 8 or 4 hours each day respectively. The start time for the Part timers is flexible on each day.

Per diem staff (PD) is sourced from local agencies and other parts of the business and can provide capacity on a daily basis. Availability is subject to advance notice before the week commences.

9.2.3 Performance Measurement

Capacity is based on the available production hours multiplied by the standard production rate for a particular section.

$$Capacity = Standard\ Rate \times Production\ Hours$$

Productivity is based on the actual amount produced compared with the capacity.

$$Productivity = \frac{Production}{Capacity} \times 100 = \frac{Production}{Standard\ Rate \times Production\ Hours} \times 100$$

Timeliness is a measure of the service level in the Payments Unit. It is the percentage of items cleared on the day of receipt in that section.

$$Timeliness = \frac{(Input - Total\ Carry\ Over)}{Input} \times 100$$

9.2.4 Performance Management

Approximately 75% of costs in the *AOMi*® Payments Unit operation are staff costs. Managing productivity is therefore an essential competence if the best possible margin is to be attained in the business.

Productivity and quality are the two dimensions of individual performance. *AOMi*® operations management framework takes the view that influences on individual performance can be classified under three headings; Willingness, Ability, and Opportunity.

The scope of this study will be limited to the specific section for which decision support tools are designed. Further discussions will therefore not include sections that are not covered but this does not mean their impact on performance of the SLAs is not regarded.

9.2.4.1 Quality and Service management

In order to aid in the meeting of SLAs for quality and service a quality section needs to be set up and will undertake two activities; auditing work before it goes to the customer, and handling customer complaints.

Staffing structure of the quality section is similar to that of any other section. The quality section will add to costs but since it is not part of workflow it has no contribution on production output for the Payment Unit.

9.2.4.2 The Operations Management Challenge

The challenge in the *AOMi*® Simulation Training is to achieve an optimal balance between **Quality, Cost, and Timeliness**. Even organisations with clear profit motives, such as banks, have to operate within certain financial and operational constraints.

The task of finding the globally optimal set of operating conditions that satisfies all constraints is a truly huge task for the average human. The problem is that the *AOMi*® Simulation Training environment does not attempt to apply direct computer based operational research methods as a way of exploring the search space for ideal input combinations.

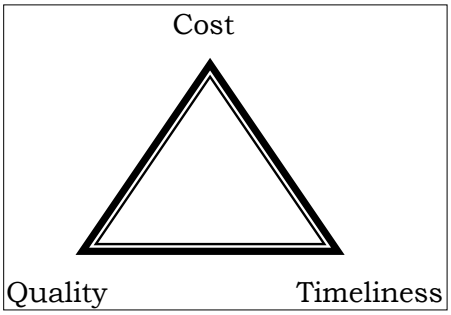


Figure 90: The Operations Management Challenge

9.3 DECISION SUPPORT UTILITY OPTIMISATION MODEL

9.3.1 Model objectives

The objectives of the model developed through this research effort is to provide a robust, metaheuritics based, decision support tool for the allocation and assignment of the partially multi-skilled workforce in the *AOMi*® Simulation Training environment. The justification for this work is further based on the adaptability of the tool for everyday application in a real world operations management environment at the case study bank.

As per preceding description there are a multitude of factors affecting the performance of KPIs. When considering the organisation as a pure "for profit" undertaking then Service and Timeliness could be formulated as constraints rather than objectives. However true to the *AOMi*® scenario, and indeed at the case study bank, these KPI cannot be treated as constraints since they consequently contribute to the performance of the Cost KPI.

In this research the contribution of each variable to the KPI is scored and ranked accordingly to come up with a weighted score which, for the purposes of decision making, are an indicator of actual KPI impact.

It is essential to note that the model is meant as a decision support tool for planning purposes and will not replace the planner. It is the responsibility of the planner to imbue the model with refinements to the prescribed best practice strategies (or indeed their own).

The model aims to maximise the contribution score of each decision making unit (DMU) so as to optimise the overall operational performance of the unit. The tool can be applied both for forward planning and eventuality contingency re-evaluation since available staff compliment is fixed after a week starts. From this stand point it is also the aim of the model to minimise fallout from daily combined absence. This tool allows for the quick deployment of quantitative methods to workforce assignment and allocation thus minimising the reliance on "thumb-suck" decisions that are prone to errors and non-optimality. Trade-offs certainly exist between the model's three objective KPIs and are captured by the structure of the model.

Partial multi-skilling of a workforce allows for useful flexibility when making workforce allocation and assignment consideration. It is however worthy to not that previous research has shown that there exist diminishing benefits from multi-skilling workers. Previous efforts determined that when scope and level of multi-skilling is increased beyond a certain point, the benefits become marginal (Gomar et al., 2002).

9.3.2 Model capabilities

The mathematical formulation of the problem is presented in the section below. A detailed description and exploration of the analysis (DEA and AHP) (Azadeh, Ghaderi, Mirjalili, & Moghaddam, 2011)and formulation of the optimisation model are outside the scope of this study and are implicitly assumed going forth; however it can be made available upon request from the author. The logic of the model can easily be traced from the excel optimisation model also available upon request.

The workforce allocation and optimisation model is capable of optimising the staff allocation and assignment process for a partially multi-skilled staff complement. The model is also capable of finding secondary, post planning, optimality to cater of day to day eventualities as a result of certain acts of nature, absenteeism and lateness.

9.3.3 Model Formulation

Parameters

Sets:

I	*set of workers*
J	*set of roles*
K	*set of payments unit roles (jobs)*
L	*subset of workers that can do job k*
M	*subset of jobs that worker i can do*

Data:

WP	available workforce pool to draw staff for the week
p_i	individual salaries of available workforce pool
P	sum of all salaries of workers available ($P = \sum p_i$)
p_{ij}	salary of worker i assigned to work and allocated to job j
E_{ij}	raw error rate for worker i assigned to job j
e_{ij}	quality adjusted error rate for worker i assigned to job j
C	cost performance score
S	service performance score
T	timeliness performance score
S^*	service SLA
T^*	timeliness SLA
Q^*	quality check level for workers allocated to quality team
W_{ijt}	total production of worker i doing job j over time t
$w^{co}{}_{jt}$	total work carried over for all jobs j over time t
T^P	production period
$t^P{}_{ijt}$	portion of production period t spent by worker i on job j

Decision Variables:

W_{ijt}	worker i hired or allocated to job j *at* time t

Objective Function:

The objective function for the model uses three main terms.

- Maximising Cost Performance Score (C)
- Maximising Service Capability Score (S) and
- Maximising Timeliness Contribution Score (T)

$$\boldsymbol{Max\ OBS = C \times S \times T}$$

where: $\boldsymbol{C} = \frac{\left(P - \sum\sum P_{ij}\right)}{P}$ ..... $\forall\ i \in I, j \in J, t \in T^p$

$$\boldsymbol{S} = \boldsymbol{1} - \left|\frac{\left(S^* - \sum\sum\sum e_{ijt}\right)}{S^*}\right| \quad \text{..... } \forall\ i \in I, j \in J, t \in T^p$$

where $\sum\sum\sum e_{ijt} = S^* \times \sum\sum\sum e_{ijt}$ ..... $\forall\ i \in I, j \in J, t \in T^p$

and $S^* = \frac{\sum\sum\sum q_{ijt}}{\sum\sum\sum W q_{ijt}}$ ..... $\forall\ i \in I, j \in J, t \in T^p$

$$\boldsymbol{T} = \boldsymbol{1} - |\boldsymbol{1} - (\boldsymbol{T}^* - \boldsymbol{t})|$$

Where $\boldsymbol{T} = \frac{\sum\sum w_{jt}^{co}}{\sum\sum W_{ijt}}$ ..... $\forall\ i \in I, j \in J, t \in T^p$

Constraints:

$\sum\sum W_{ij} \leq$
WP ..... $\forall\ i \in I, j \in J$

$0 \leq \sum\sum W_{ij} \leq 6$ ..... (i.e. $\sum\sum W_{ij} \in \{1, 2, 3, 4, 5, 6\}$) $\forall\ i \in \{S\}, j \in J$

$\sum\sum W_{ij} = 1$ ..... (i.e. $\sum\sum W_{ij} \in \{1\}$) $\forall\ i \in \{WL, PT, FT\}, j \in J$

$\sum\sum W_{ij} \leq 1$ ..... (i.e. $\sum\sum W_{ij} \in \{0, 1\}$) $\forall\ i \in \{PD\}, j \in J$

$\sum\sum tp_{it} = \left|T_p\right| \times \sum W_i$ ..... $\forall\ i \in \{S, WL, FT\}, t \in T^p$

$\sum\sum tp_{it} = \frac{1}{2} \times \left|T_p\right| \times \sum W_i$ ..... $\forall\ i \in \{PT\}, t \in T^p$

9.3.4 Model Solution Engine

While various methods exist for approaching optimisation problems of this type, this attempt only aims to endow the solution engine with the level of robustness required for the fast passed simulation environment (Akinyele, 2007; Mason, Ryan, & Panton, 1998), (Cezik & L'Ecuyer, 2008; Hajipour & Pasandideh, 2012; Wongwai & Malaikrisanachalee, 2011). This level of space searching is necessitated by the need to have short run times required for each assignment and allocation cycle. Indeed in the real world application there would be better opportunity to more meticulously explore

the available search space (Ingolfsson, Campello, Wu, & Cabral, 2010). The model set up therefore allows for escalation in complexity and algorithm variation to cater for different levels of staff multi-skilling and availability vectors. The model is set up in excel and the solution done through a VBA coded metaheuristic based algorithm. The algorithm used is Particle Swarm Optimisation (PSO). This algorithm has been shown to be effective in the solution of integer programming problems and has the adaptability to be embedded in a decision support utility used for the type of problem presented here.

9.3.5 PSO Pseudocode

```
1 for each particle (solution): initialize particle (i)
2 do
3    for each particle (i): calculate fitness value.
4    If the fitness value is better than the best fitness value (pBest) in history
5       update current value as the new pBest.
6    Choose the particle with the best fitness value in the neighbourhood
7    For each particle (i)
8       Calculate particle velocity according equation (a)
9       Update particle position according equation (b)
10 While maximum iterations or minimum error criteria is not attained
```

9.4 CONCLUSION

The analysis of the *AOMi*® Simulation Training environment and model formulation process highlighted the need for simple and effective operations management session support utilities. While the reliance on experience and prescribed best practise has a good effect on business the use of quantitative optimisation decision support tools can further enhance the operations of business. Metaheuristics based approaches to linear and non-

linear programmes allow the fast and effective exploration of vastly complex search spaces to yield near optimal solutions. Indeed many different algorithms are available for approaching the various problems that exist in business and theory; further research and application of these methods in targeted areas will only go further towards improving operations.

Further research still exists for this work as the primary focus of this study was the problem formulation and solution design for the specific simulation environment. Work can be put into extending the model to fit a real world scenario that has by far a greater level of complexity and constraints demand. Work can also go into evaluating the performance of different algorithms and execution platforms in order to come up with the best combination depending on the nature and complexity of the specific problem.

CHAPTER 10

CONCLUSION AND RECOMMENDATIONS

10.1 OVERVIEW

Lean, Six Sigma and TOC have been the most prominent process improvement methodologies since their respective inceptions. While these methodologies have their roots in the manufacturing sector they have found their way into more non-traditional environments as they continue to be applied to achieve breakthrough performance. Whilst good advancements have been achieved with the application of these methodologies in the services industry few studies exist on this deployment and this is more so true for the sub-Saharan African subcontinent.

One of the more non-conventional fields of application is the service industry and more specifically the banking sector. This study was aimed at investigating the application of Lean Six Sigma and TOC in the South African banking services sector. This was achieved by defining a process improvement model specifically developed for the sector and also by reviewing case studies of its application.

While the study includes general overviews of the tools and techniques applied within the case study industry the case studies have been limited to robust examples of the application of the hybrid methodology and part thereof. The choice of methodology is loosely governed by the clarity and complexity of the problem and possible solution.

It is important to note that even though there has not been a deliberate effort to formally integrate TOC into the process improvement frameworks used here there is an implicit use of some of the tools and techniques from the methodology to better focus the efforts of Lean Six Sigma. This is therefore a gap identified for the further enhancement of the process improvement framework defined in this body of work.

The framework investigated in this study was developed within GBT via a collaborative strategy building approach. The outcomes were influenced by the literature study and best practices indicated and proposed in this work. BMGI® consulting group was then contracted to roll out their Lean Six Sigma approach as the core tactical engine around which the CI Framework was built. The consulting group were also tasked with build the process improvement capability within the organisation up to the point where the business becomes self-sustaining at the ends of the engagement period. The training programme already described in the preceding sections places a strong emphasis on the tools and techniques to be used within the LSS methodology. Particular emphasis is also placed on training the delegates on the use of the analytical software chosen for use within the organisation. Another very important focus that is critical for the overall deployment of the

methodology and capability build is on change management. Change management is recognised as an integral part of introducing, building and sustaining the process improvement framework in this non-traditional environment.

The level of investment made around the capability build highlights the importance of process improvement to the overall success of the business going forward. This endorsement and robust deployment of LSS training also shows that the industry has given to the methodology a strong vote of confidence going forward.

10.2 Attainment of Research Questions and Hypothesis

The following questions were posed at the beginning of the research process:

1. *"What are the current banking service quality management initiatives in South Africa?"*

A survey of the process improvement landscape in the South African Banking sector evidenced a history of accounting based cost reduction drives as the basis for continuous improvement. This approach was however not customer-centric as the improvements in quality were secondary as a consequence of cost reduction drives.

With time some organisations moved towards the implementation of Lean as a way of moving towards looking at quality from the customer's point of view. Absa is a good case study for the implementation of Lean in banking; pockets of Lean capability were developed to streamline back office operations. Lean provided a simple methodology that allowed practitioners

to define value adding and non-value adding components in service offerings and operations. The simple set of tools that lean provided for the analysis and improvement of processes provided a foundation for the establishment of a more robust process improvement capability in the future.

Lean Six Sigma is only now becoming the service quality driver in Absa, and indeed other financial services organisations. This is clearly evidenced by the growing number of LSS certified process improvement practitioners. The preference of certified practitioners in the recruitment process also underscores the endorsement of the growing maturity of the resource base available in the market.

2. *"Can a LST framework be tailored for the South African banking industry?"*

A strong conclusion can be derived from deliberate efforts at the case study organisation which have shown that a LST framework can indeed be tailored for implementation in the non-traditional financial services environment. While the current framework has not reached the level of formally adopting TOC as a way to better focus LSS efforts there is a clear implicit use of the tools within the deployment.

The LST framework in the case study organisation is currently placing a big emphasis on building the PI culture and capability across the organisation. The deployment of the methodology would not have realised the success it has had to date if awareness and buy in are not pursued in the general populace. Reliance on external capability was, early on, identified as a

potential weakness in the capability build journey. The capability build programme thus included plans to eventually internalise LSS expertise by developing practitioners right up to the competency level of Master Black Belt. This approach will allow the organisation to eventually wean itself from the reliance on external capability providers.

3. *"Can service quality case studies test and validate the applicability of the framework?"*

The case studies showcased in this work adequately showcase the applicability and effectiveness of Lean and LST deployment in a banking services environment. Data maturity is however highlighted as a prerequisite for a full and robust LST deployment. In situations where data availability still lags process improvement can still comfortably rely on pure Lean efforts to implement quick wins and form the basis for improving process data maturity.

The home loans case study presented a clear opportunity to showcase the application of the DMAIC methodology on a service process improvement initiative. The tools and techniques of the methodology were applied to gain effective improvements in process performance. The old adage that claims LST to only be applicable in pure manufacturing environments is therefore disproved by the successful validation of LST in the South African banking setup.

As a slight detour from project based process improvement effort the author took the liberty to investigate the application of service operations

management decision support tools that may enable the efficient management of improved process framework. It is the belief that while active capacity management exists in the case study institution the development of modules to support decisions on the data available will lead to better efficiencies being derived from the workforce working on improved process lines. Operations research based decision support tools have a proven track record of being key enablers in the effective day to day management of dynamic operational environments such as service organisation work centres.

The following hypothesis was then made at the beginning of the study:

> *"The development of a banking sector focused implementation framework model for LST will improve service sector understanding of the hybrid LST methodology"*

The findings made in the background research and the work showcased at the case study organisation can safely help us to conclude this hypothesis to be true and accurate. While the framework has not reached full maturity to explicitly include the TOC as a formal methodology certain key elements are embedded in the deployment. This body of work should improve the understanding of the application LST in the banking service sector within the South African sector. Further work to refine the framework will only add to the value add proposition of LST in the sector.

10.3 CONTRIBUTION TO BODY OF KNOWLEDGE AND THE "REAL WORLD"

The banking services industry, being a non-traditional field for the application of LST, has received very little academic attention in literature. No industry specific LST process improvement framework had been defined and technically reviewed within the South African. Limited studies, mostly done as part of MBA research, exist focusing on the business bottom line. These studies have however lacked in linking the customer centric view of process improvement to the technical tools and techniques applied to achieve the desired process performance. This body of work makes the novel effort to clearly define a technically based process improvement and capability building framework within the banking industry. This work further goes to review case studies of actual deployment of the framework within the case study environment as a way of validating the applicability and effectiveness LST in banking. One of the most useful contributions to existing literature was in highlighting the gap that exists in the formal integration of TOC within the process improvement framework. While TOC has, on its own, been successfully deployed within the accounting field it is yet to be fully integrated in the mainstream process improvement hybrid methodology.

The real world contribution of this work is in its potential to form a robust showcase piece for the process improvement works in the case study organisation. The current process improvement capability building effort within Absa/Barclays Africa has not received any academic scrutiny as yet. This work will enable the GBT team to build its reputation as a relevant and

technically apt organ within the broader business. The work will also feed towards enabling the formal integration of TOC in the still evolving business process improvement framework. This study will therefore go a long way in creating awareness and build the process improvement culture at all levels of the business.

10.4 Recommendations and Future Work

The following are recommendation for future work within the case study organisation and general field of research:

- There is need to formally integrate TOC into the current LSS framework in order to enhance the full deployment of the hybrid LST methodology. The current capability build has its foundation in LSS with implicit applications of just some of the tools and techniques of TOC.
- Industry in general should take steps to improve process data maturity within their operations. A lot of data is available in terms of financial performance whereas process improvement initiatives rely more on operational metrics. Financial metrics are not ideal to use as primary metrics as they are a calculated value based on the trend of the actual, near process, primary measure. They therefore tend to be consequential to the trend in the primary measure and are open to distortion through financial adjustments that have nothing to do with any process changes made.
- There is need for a purely academic study to be conducted based on the idealised research methodology and experiment design proposed

in the first chapter of this work. This type of study would carry a more rigorous statistical interrogation of the effectiveness of the individual methodologies and combinations thereof. The amount of statistical rigour and experimental design proposed in the idealised methodology may therefore be proposed for work at PhD level.

- While adequate effort has been made to define the LST framework deployed at the case study organisation the validation thereof is based on only two case studies. There may be need to review further case studies across the entire process landscape of the organisation in order to create a better basis for proposing the LST framework for all financial service organisations.
- An opportunity exists to conduct a study on the people element around deployment of LST in the non-traditional banking sector. Survey studies should be conducted on LSS practitioners and experts, management and general workers to determine the level of process improvement culture maturity. A recommended tool for such a study would be the Lean Enterprise Self-Assessment tool as developed by the MIT. This analysis may be useful in tailoring the framework on the change management as this is a critical factor for success.

10.5 Concluding Remarks

As process improvement methodologies Lean, Six Sigma and the Theory of Constraints provide a strong theoretical foundation for affecting breakthrough performance in the service industry. The merging of these

methodologies creates a robust framework that enables the maximisation of benefits from a business process improvement effort.

Total organisational commitment is however required if the application of any process improvement framework is to be a success. This underpins the importance of process improvement capability and culture building with any implementation. Total employee commitment therefore demands an effective training programme coupled with support and recognition from senior management.

While the implementation of LST in the manufacturing sector has a proven track record the results obtained in the case study organisation indicate that the framework has the potential to positively influence performance across a wide variety of financial services organisations in South Africa. Adequate supporting evidence has therefore been provided to support the conclusions in this study. There is still a need to formally fortify the merging of the three separate methodologies, into the LST framework proposed, to ensure that its effectiveness is effectively tested within the service environment.

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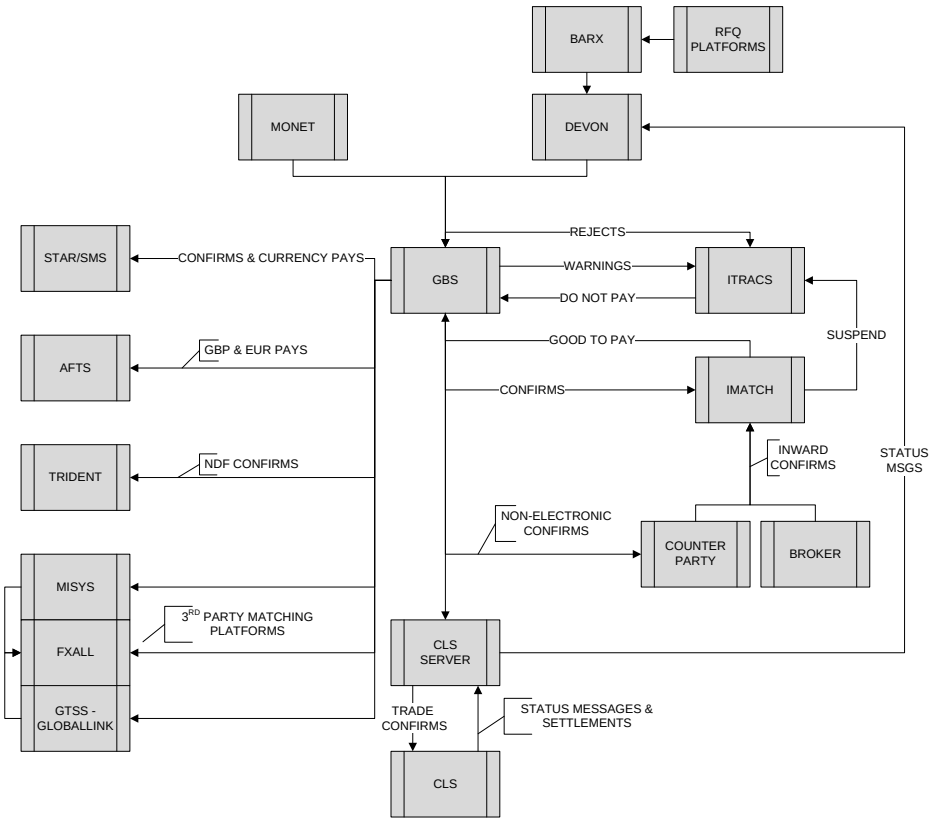
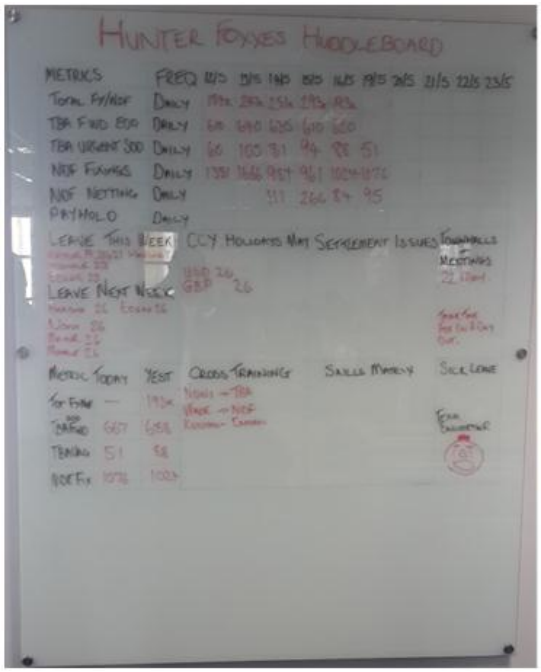
APPENDIX A: HIGH LEVEL FX TRADE AND MESSAGE FLOWS



APPENDIX B: SETTLEMENTS HUDDLE PHOTO



APPENDIX C: INVESTIGATIONS HUDDLE PHOTO

APPENDIX D: CONFIRMATIONS HUDDLE PHOTO

APPENDIX E: CONFIRMATIONS CYCLE TIMES - TIME STUDY DATA

Description	Title	Cycle Time Per Item (Min)	Cycle Time Per Rec (Min)
FX	FX Host Chasing	4	
	FX Host Chasing (2nd Chaser)	10	
	FX Host Chasing (3rd Chaser)		40
	FX Alleged Main Report		8
	FX Alleged Regardless Report		
	FX Alleged queries	7	
	FX Proposed - Financial		20
	FX Proposed - SSI		30
	FX BTB	2.5	
	FX B2B queries	5	
MM	MM Host	6.5 min	
	MM Alleged	4	
	MM Alleged (BZW)	4	
	MM Proposed - Fin and SSI		10
	Suspended Investigations	15	
	MM BTB	2	
	MM B2B queries	5	
	MM Treasury Confirmations	9 min incl printing	
	MM Summit Paper Confirmations	10 incl printing if all in order	
	MM Summit Paper Confirmations Query	20mins	
	ECO Funding and GSU	10mins	
CLS	CLS	whole day spent on emails	
	CLS hand over	90mins	
	Cls Projection	15	
	Fwd capT&V	3	
	Static set ups	5	
	CLS SDS		
Scanit	ScanIT		
	* Printing	3-4 mins	
	*Scanning	10-15 mins depending on size	
	*Editing	3mins	
	Hotlines		85mins
	catagorising emails	180min	
Adhoc	SGP Shift London Chasers	3	
	SGP Shift London Chasers	?	
	SGP Shift London Chasers	?	
	Duplicate Confirmations/repair items	5	
	Novations	4 hrs minimum	
	Adhoc Queries	5	
	Bqueries	7	
	LFC's Bespoke	5	
EOD	FX Suspended EOD	10	need to factor in waiting period to paste into the EOD
	MM Suspended	5	need to factor in waiting period to paste into the EOD
	MM Host Chaser EOD includes B2B	20	need to factor in waiting period to paste into the EOD
	FX Host EOD	10	need to factor in waiting period to paste into the EOD
	FX Alleged EOD Report	20	need to factor in waiting period to paste into the EOD
	MM Alleged	10	need to factor in waiting period to paste into the EOD
	Dubai	10	need to factor in waiting period to paste into the EOD
	No deal notes	can be up to a minute per item depending on system latency	
FX	Greater than 20mil reports not included for Host and alleged.	45 min per report	
FX	There is the third chaser and calling sometimes	10 cycle time per item	
MM	Greater than 100mil reports not included for Host and alleged.	30 mins per report	

APPENDIX F: SETTLEMENTS CYCLE TIMES - TIME STUDY DATA

Process	CT
TBA - FX	3 minutes
Payhold - FX	2 minutes
NDF - TBA	1 minute
NDF - Netting	30 sec
NDF - Payhold gross	2 minutes
NDF - Fixing	2 hours per day

APPENDIX G: INVESTIGATIONS CYCLE TIMES - TIME STUDY DATA

Process	Avarage Cycle Time
Quick Matching	5 sec /match
Mark Ups**	8min /item
Recodes	1 min 50 sec /item

**Weighted avarage for simplex and complex items (weighting based on actual measurement and estimated average peak volumes for each)

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10 September 2014

RE: REQUEST TO WITHHOLD GRADUATE THESIS FROM PUBLIC RELEASE

Dear Sir/Madam,

The Department of Industrial Engineering, for the Stellenbosch University, is hereby requested to temporarily withhold public release of the following thesis for a period of **3 years**:

Student Author	:	**Marvel Mandaza (16772350) – MScEng (Industrial) Candidate**
Thesis Title	:	**Lean Six Sigma and Theory of Constraints for Service**
Date of Degree Award	:	**December 2014**

Reason for Withholding Thesis:

Pursuant to the right to grant a research sponsor the opportunity to conduct prepublication review in order to identify sponsor's proprietary information or potentially patentable inventions the following has been determined:

Barclays Shared Services Africa (BSSA), as a business unit of Barclays Africa Group Limited (BAGL), enables and operationalises the group's strategic focus on customer centricity, cost leadership and control rigour. While the high-level BAGL strategy is understood by the investor community, the operational/ process efficiencies and financial benefits discussed in Chapters 6 – 8 represents intellectual property specific to the operating model of our business. I would therefore like to request that the University of Stellenbosch place a general embargo on the publishing of this thesis as a public resource, for the specified period of time. This would facilitate the submission and grading of the thesis; but would not compromiss the achieved and/or projected competitive advantage of the activitities discussed in Chapters 6 – 8.

Yours sincerely

Bevan Smith

Head Risk and Governance (Barclay Shared Services Africa)

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