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DETERMINING THE SCOPE FOR FUTURE AUTOMATION OF BANKING PROCESSES

Final Report

ABSTRACT

The majority of banks in today's market have suffered in recent years from declining consumer confidence and negative attention brought about by the latest economic crisis. Through research of this problem and the selection of a suitable systemic approach, this project aims to identify the scope of, and determine the viability for, automation of a number of existing banking processes and make appropriate recommendations based on this. Since no two banks will be identical, a 'generic bank' will be defined, modelled and analysed using an appropriate approach, existing knowledge, extensive research and input from existing bank employees. This Final Report serves as a guide to the work that was undertaken throughout the project as well as a reflection on the experience and learning gained.

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Determining the Scope for Future Automation of Banking Processes

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INTRODUCTION

The banking industry has suffered from a lack of consumer confidence of late after the recent financial crisis and numerous stories in the national press about bad service, excessive bonuses and poor risk management. However, it cannot be forgotten that a significant proportion of these mistakes are the result of human interference and often human error. Despite the technology age that we currently live in, many processes in today's banks require manual operation and are therefore susceptible to these errors. While it is clear that many existing systems rely on a human element to function correctly, would this be the case if designed differently from the outset?

Aims and Objectives

Automation of processes has a number of clear benefits in the business world but it is also a matter of contention for many people as it can often lead to job losses and the removal of the 'personal' aspect of interaction with a system. This project aims to investigate the viability of automation of processes and systems in the banking industry and the identification of the costs and benefits of doing so in order to make justifiable recommendations based on this. While many banking organisations offer similar services and products, no two banks are identical. Therefore a generic model of a bank is required. To allow a generic adaptation of a bank to be developed, Soft Systems Methodology (SSM) will be used as the primary method as this allows a system to be modelled from a succinct description of its purpose. I have worked for Lloyds Banking Group (previously Halifax Bank of Scotland) since 2007 in a customer-facing branch environment and also spent a summer working in their Credit Card finance department and plan to use this experience, along with extensive research, to develop a comprehensive model that is sufficient for the purpose of this project. Once developed, a number of banking professionals from various organisations will be interviewed to gain their opinions on the model and hopefully identify any omissions or errors in an effort to produce a fully validated model. It is this model that will then be analysed for the viability of automation and the possible costs and benefits of doing so.

It is envisaged that the conclusions of this report can be used as a reference point for academics in the field of finance and banking as well as a guide into the use of generic models to improve real-world systems. While it is unlikely that every suggestion of system automation is going to be adopted by banks soon, this report will aim to identify the *possibility* of automation of these processes in the future.

Interim Report

The Interim Report (see Appendix A) mainly covered the background analysis of the problem and the initial research into the relevant topics. These areas and the information gathered for the Interim Report will be referenced and expanded where appropriate in this Final Report. As well as covering the research required for the project, the Interim Report also investigated the various academic questions that will arise during the project, such as the value of a generic model and how it can relate to any organisation within the industry. The final topic covered in the Interim Report was the analysis of the possible approaches to take to produce a suitable solution and conclusion. Although it was determined that due to the nature of the problem and the need to develop a generic model, SSM would be the ideal methodology to use, this report also looks deeper into that selection process. SSM will be supplemented with interviews with current bank employees to validate the resulting model as well as to gather their opinion on the prospect of automation of a number of banking processes.

Assumptions

Throughout this project, a number of appropriate assumptions have been made and are as follows:

- No two banks are identical in structure or the processes that they use.
- Overall customer satisfaction is highly dependent on the quality of service received.
- Quality of service is dependent on factors such as speed and consistency of response and the degree to which customer needs are met.
- All banks will employ individuals responsible for the compliance of systems, while the banks are also required to undergo periodic audits by regulated third parties.
- Existing automated solutions use technology that can be extrapolated into a banking environment.
- Existing bank employees will have some awareness of the overall structure of their bank.
- Existing bank employees will have knowledge of recent attempts at automation and how it was achieved.
- Banks actively try to exploit technological developments to improve existing processes and remain competitive.
- The Board of Directors and senior management of a bank are responsible for activities such as the definition of a company vision and the desired business culture and working environment as well as the development of the overall strategy for the organisation.

- The competitiveness and reputation of an organisation as well as customer awareness are measureable in some way.
- All banks will develop procedures for the opening of accounts and the way complaints and queries are dealt with.
- All banks will develop 'offers' that are not available to all customers with the aim of developing customer relationships.

Expected Outcomes

The implementation of SSM with regards to this problem will produce a set of suitable Root Definitions for a generic bank and a resulting Enterprise Model. Each activity in the model will then be analysed in turn to identify the potential for automation. This project aims to evaluate this activity analysis stage to determine the viability and scope for automation of activities such as 'assess the public's financial needs' and 'open new account' and the associated costs and benefits of each, allowing any final recommendations to be justified appropriately.

BACKGROUND AND FURTHER RESEARCH

Prior to the application stage of this project, extensive research was undertaken into the background of this problem to gain the required knowledge of the subject areas and the proposed approaches. This research was covered in the Interim Report (see Appendix A). However, as the project progressed a number of new areas of importance came to light that needed research along with some expansion on the original areas of investigation. This new research will be covered in this section.

The banking industry is in the midst of a period of negative coverage and public opinion and much of this is based around the perception of poor decisions that the management of each bank take on a regular basis as well as with a long-term vision in mind. Much of this negative attention has arisen from the view of many people that banks have neglected the focus on customer service for an unrelenting search for profit, which has recently become a struggle. The activity of automation has become more prevalent in recent years in banks with the use of automated paying-in machines and the widespread adoption of online banking services. This project will investigate whether automation can be used on a wider scale in banks to improve the current processes as well as public perception with the eventual hope that banking officials can use the final recommendations to identify areas in their own business that can benefit from the use of a programmed system.

The Banking Industry

The current public perception of banks is brought about by a number of factors. Many consumers lost trust in their banks following the recent financial crisis and no longer have a favourable opinion on these organisations [1]. As mentioned in the initial research conducted for the Interim Report, a major factor in the financial crisis was excessive, and ultimately poor, risk-taking by the people charged with running these financial institutions. The fact that many of these high-ranking individuals earn seven-figure salaries and bonuses while operating the banks in such a way that overall profit is a recent rarity, while the banks also remain highly susceptible to further economic downturns, is also unlikely to raise the public's trust or opinion. A report from 2004 investigated the current culture seen in banks and highlights a significant difference between the culture that the banks aspire to have and the culture that actually exists [2]. Aside from a small minority of banks that can truly state that their culture is based around that of customer service, most others place the maximisation of profit as opposed to customer service as their main focus. This stance is likely to be determined by the level of pressure received from investors and competitors as well as a resistance to change the existing culture and as long these factors remain prevalent, the overall focus of a bank is unlikely to shift significantly.

As well as the experience of the financial crisis, there are countless stories regarding the poor quality of customer service that customers have suffered when dealing with their banks. My personal experience of working in a bank branch has given me considerable knowledge of some of the major gripes that customers have regarding the service they receive. Call centres are often a focus of this attention as the automated dialling response is often confusing and frustrating. A lack of consistency of service also leads to customer irritation. For example, Lloyds Banking Group offers current accounts which are entirely self-service and all branches offer the relevant systems to allow customers to operate these accounts. However, many employees will manually process transactions on these accounts at the counter while other employees advise the customer of the correct way to complete their request. Inevitably, many customers respond with "Well they let me do it last time!" and their frustration increases when the advisor notifies them again that it is a self-service account and they will not process the transaction at the counter. That is just one of a large number of customer service issues that are experienced in branches nationwide. A 2011 report by the Innovation Agency looked into the effect that innovation in banks in South Africa has on organisation differentiation and customer satisfaction [3]. While excellent customer service was not high on the list of reasons for being considered innovative, it was a clear leader in the reasons for why customers decided to switch their accounts to another bank. Poor service and a negative customer experience lead to complaints that are often finalised only with the offer of compensation or closure of account. These outcomes are an

unnecessary financial and reputational cost to the bank and result in a loss of business as the customer moves to a competitor.

One bank that has actively recognised that customer service plays a significant part in the reputation of the organisation and has made changes to its approach is Metro Bank. Metro Bank was launched in 2010 and is the first new bank to the UK high streets in over 100 years. In an attempt to offer 'remarkable' customer service, they have introduced aspects of service never seen before in UK banks such as evening and Sunday branch opening and free refreshments for children as well as actively encouraging customers with dogs to come into their branches where they offer fresh water and dog treats [4]. On top of this, Metro Bank aims to open accounts for a customer within 15 minutes, while a one hour appointment is the norm in most other major banks, which is often discouraging and inconvenient for both new and existing customers.

It isn't just banks in the UK that are starting to recognise the need for a change in customer service. In December 2011, DNB Telebank of Norway used the country's most famous boys' choir to sing each phrase spoken on their automated telephone service. This replaced the previous plain man's voice and resulted in the service receiving more than 2 million calls during December, which remarkably is just short of half of the entire population of Norway [5].

The main drawbacks for automation of processes were described in the research section of the Interim Report (Appendix A), but are not specific to automation in banks. A recently published article by Simon Caulkin of The Daily Mail [6] argues that the automation of banking systems, specifically the interactive voice response used by called centres, are having untold consequences for both the bank and its customers. The idea of disengaging staff from the customers is leading to organisations that are remote, unappealing and lacking the required knowledge to truly identify what customers want. Automation must be done sensibly and not solely to maximise profit, but recent cases are *removing* the customer service element rather than *improving* the quality of service. Caulkin states banks cannot afford not to reverse this trend and rebuild personal relationships with customers as shown with the recent payment protection insurance redress ordered by the FSA, which totalled £2.1bn for 2011. These redress payments were ordered as a result of banks not taking customer needs into account and mis-selling the accompanying product insurance [7].

In order to identify the core purpose for a generic bank, which will later be modelled, research was also undertaken into the key goals and objectives of today's banks. The research up to this point has shown previous investigations into the existing culture of the banking industry and shown that it is more driven towards making a profit than being customer-focused. A number of other typical objectives and purposes of banks will be

derived from analysis of the vision or mission statements of a number of high street banks in the UK. The key aspects of each are shown below:

Bank	Objective
Lloyds Banking Group [8]	▪ Make substantial investment in better value products and service for customers ▪ Deliver strong and stable returns for shareholders
Santander [9]	▪ Be profitable for shareholders ▪ Be collaborative for the sustainable development of society ▪ Meet all financial needs of its customers
Royal Bank of Scotland [10]	▪ Deliver superior sustainable value ▪ Deliver optimum financial results within clearly defined business principles
Northern Bank [11]	▪ Have relationships with customers based on respect, openness, integrity and responsiveness ▪ Offer the best solutions and service through knowledge of customers needs, circumstances and wishes ▪ Be a socially responsible bank

While all of these objectives are desirable, none of them can be achieved without also investigating what customers want to see from their bank. The primary desires include better value for money, lower bank charges and better customer service [12]. Some sources rank these desires differently from this and offer conflicting advice in that customers want to see better service over rates [13], but whichever feature is considered most important, the overall list of primary desires remains consistent and are what the public would like to see improved in banks. A further desire of customers that is common is the ability to do more with online and mobile banking and for all accounts to be generally more accessible [14]. Introducing more services to online and mobile banking facilities will effectively involve the automation of certain tasks. Accommodating many of these customers' desires will considerably help push the bank to the forefront of public perception of the industry.

Programmed Decisions

So that process automation can take place, the relevant types of decisions that the organisation might make have to be identified. It is these decisions that can then be automated with the implementation of algorithms. Any new system would then eliminate the need for human-decision makers in that particular area, hopefully leading to a more consistent outcome with fewer mistakes being made. Certain events or milestones can trigger the algorithm to process the data, analyse the pre-determined business rules and action the programmed instructions to specify an outcome [15]. Dan Power, an expert in decision support systems, argues in his 2002 book DSS Concepts [16]:

> *"routine decision situations should be analyzed and 'programmed' as much as is possible and they should be supported in most situations by technology. The potential rewards from improving routine, recurring decisions are usually very large"*

Since the overall decision-making process often involves the gathering and assessing of intelligence before making an informed choice, automation can be done on all or part of the decision process, depending on the complexity of the specific situation.

The types of decisions that are typically used for automation are called programmed decisions, which are those decisions that are often repetitive and routine and can be handled with the application of certain business rules. In contrast, non-programmed decisions are those decisions that do not occur regularly and are often complex and unique in their nature [17]. These types of decisions sometimes require a custom-built response. Because of the complexity and non-routine nature of non-programmed decisions, making a mistake can often have consequences for the organisation in question and therefore they should be treated with due diligence.

Programmed decisions are often those decisions that are made on a day-to-day basis by lower-level management and many of the techniques used to make these types of decisions follow business rules, thus opening up the possibility of decision automation. Some of these techniques include linear programming, decision trees, simulations, probability decision theory and so on [18]. Automation is possible with these types of decisions because they can be represented as an algorithmic procedure in such a way that following the step-by-step formula can lead to the selection of the optimum solution [19]. On the other hand, techniques for making non-programmed decisions are often more manual in nature and include brainstorming, the Delphi technique, heuristic techniques and quality circles [20]. The subjective nature of these techniques and the often required involvement of experts greatly reduces the prospect of automation. Even if automation were achieved with these types of problems, the fact that they do not occur on a daily basis may mean that the benefits do not outweigh the original cost of automation. There is also the possibility that the individuals who are normally involved in making these decisions, which can often be strategic for the organisation, do not trust a computer system to make such high-profile decisions and therefore would not welcome the prospect of automation.

Numerous algorithms regarding decision automation currently exist and many businesses offer services of creating bespoke algorithms for an organisation. One algorithm which may be used in a banking organisation would be one that computes relevant policies for decision problems based on the analysis of influence diagrams at multiple stages of construction [21]. This process builds a decision tree for each node in the influence diagram and imposes probabilities on the appropriate actions. As more information becomes known, the actions and probabilities are refined until the best course of action is identified. These policies can

then be either used by employees within the business or implemented as business rules in the next stage of automation of the entire decision process.

In a report published in 1996, algorithms were defined to be used in sequential decision-making that has both immediate and long-term effects for an organisation [22]. Some of the decision situations described in this report include planning in a deterministic environment such as a manufacturing plant and partially observable environments where not all information is available. The author argues that the most important area of future algorithm research is finding the restrictions to some of the more complex problems that are faced.

The identification of relevant programmed decisions that take place in businesses today will play a major role in the final recommendations for automation that will be made.

Achieving Automation

Automation is often seen as a key factor in business process improvement. Even when IT budgets are being cut, improving the efficiency of a small number of systems can prove to be an example to the rest of the organisation and serve as a catalyst for management to automate other processes. As previously mentioned, the key to automation is to focus on the right type of decisions and tasks, i.e. routine and regular, to be able to realize these new efficiencies. While automation can replace existing tedious, manual processes, it can also be used to improve the degree of regulatory compliance, with automated audit logs, and endpoint security [23]. Every organisation will continue to suffer from security threats and the demands of monitoring and managing these threats constantly often mean that automation is the only sensible option available.

Although accommodating automated processes into an organisation is desirable, a number of points have to be considered first. Firstly, automating a process that is either unsuitable for automation or is not operating correctly in the first place can cause more harm than good in the future, especially if the mistakes are not noticed early on [24]. Also, the longer the automated process is used, the greater the danger is of losing the understanding of how the process fundamentally works. Without this prior knowledge, further business process improvement in the future becomes both costly and difficult [25]. It is only after these factors have been recognized and considered and the relevant processes for automation have been identified that the actual task of implementing the algorithms for automation can take place. The research covered in the Interim Report looked at the potential benefits and drawbacks of automation in more detail as well as identifying a number of businesses offering automation services. One of the main functions of a bank is producing regular reports for internal management, shareholders and for regulatory purposes. Banks often have dedicated teams to produce reports or allocate the responsibility to personnel who simultaneously have other roles to fulfil. AutoMate is a product offered by Network

Automation that provides automated report generation and distribution in flexible formats, which would help to reduce the reporting workload that a business would see [26]. Star Analytical Services are another organisation that offers custom algorithm development services as a means of automating various business processes [27]. Their primary focus is on the development of algorithms for the analysis of large volumes of data or for the improvement of a variety of business processes.

As well as the option of outsourcing the physical development of the algorithms and decision automation systems, in-house IT teams can take up the task if the organisation has suitably skilled employees, but these resources can be expensive as they are often in high demand.

The decision automation systems that are in operation in businesses today use a compilation of a number of associated technologies such as rule engines, industry-specific packages (e.g. insurance, finance), statistical algorithms, workflow applications and enterprise systems [28] while simpler automation systems can use rules and algorithms for tasks that, while laborious, are often essential, such as data cleansing. Committing resources to developing an efficient system to undertake activities such as this can give the business a competitive advantage over those who do not [29].

Automated decision systems have been implemented to produce sound solutions in a number of business areas. Yield optimization, fraud detection and operational control are just a few. Fraud detection systems implement automated screening processes in an effort to identify possible fraud while operational control systems are programmed to sense changes in the environment and respond appropriately. However, as well as for decision-making, automation can also be focused on the monitoring, maintenance and management of systems. Remote Monitoring and Management (RMM) systems are an emerging technology that can handle the automation of various tasks, bringing benefits to the business such as reduced IT operational costs, greater proactive response and an increase in staff productivity [23].

While there are many businesses offering automation services for banks, they mainly focus on a specific aspect of the business, usually transaction processing and customer service. There is a limited amount of investigations into the feasibility of the automation of processes throughout the entire organisation, for which customer service only plays a small, but significant, part.

Use of Generic Models

The Interim Report initially covered the value of using generic models and how they could be validated to show they are applicable to a particular organisation. Further research has

since been conducted into the reasons for the use of a generic model. Some models of specific organisations or systems require activities that may cross certain organisational boundaries and the later analysis of these activities may lead to disagreements over responsibility or accountability. The investigation stage of the project is also likely to involve the gathering of opinions from various departments on the organisation as a whole and this is where further issues may arise, especially when a particular department has a narrow idea of the bigger picture of the organisation. The use of a general model aims to avoid this unwanted attention on departmental issues by focusing on how a typical system within an environment should exist.

A further point, which is increasingly more relevant to the banking industry, is that highly-regulated industries should have some basis for commonality and uniform processes in order to be compliant with all of the applicable legislation and standards. Developing a model that takes these regulatory constraints into account means that any new organisation wishing to enter the industry that follows the procedures identified in the generic model will inevitably be a compliant business.

Another argument for the use of generic models came from Brian Wilson in his 2001 SSM book [30], where he gives the example of a university wishing to develop an IS/IT strategy. The sheer complexity of the university meant that it was difficult to envisage a single strategy being evolved. However, the use of generic model reduced this complexity and departmentalised the university in such a way that subject-based variety was ignored. This allowed the university to be seen as a single organisation as opposed to a number of schools and as such suitable solution was derived.

While it is not always ideal to use a generic model to represent a particular system, there are occasions when its use is not only justified, but required, to be able to deliver high quality conclusions from the analysis.

Research Questions

Aim:

The aim of this project is to determine the scope for, and identify the viability of, automation of activities undertaken in a bank and make appropriate and justifiable recommendations through the development of a model of ‘generic bank’ in order to improve the efficiency and public reputation of banks.

Research Questions:

In order to demonstrate the achievement of the defined aim it will be necessary to identify a set of purposes of a generic banking organisation and use them to derive a list of essential

activities and systems to be included in the appropriate generic model, which is to be validated, before analysis of these activities and systems can take place to identify the potential scope for automation and assess the expected costs and benefits it may bring.

SELECTION OF APPROACH

Prior to the eventual selection of Soft Systems Methodology (SSM) as the major approach used in this project, a number of methods were considered and evaluated for their effectiveness to the given problem. Some of the approaches considered included SSM, System Dynamics and Business Process Modelling. The benefits and drawbacks of each and the reasons for the final selections are given in this section.

Primary Approach

The project requires the analysis of a banking organisation to determine which processes could potentially be automated and initially Business Process Modelling (BPM) was suggested as a possible approach. Initial research showed that certain methods of BPM, such as the Artefact-centric model, can foster the automation of processes as it places focus on the data as the main driver of the business, as opposed to the current activities or processes which may not favourably lead to automation [31]. By focusing more on the data and products of a business process, a whole new, and potentially automated, process can be derived. However, while this approach can efficiently and effectively represent the processes of an organisation with the view of highlighting areas for improvement, it does focus on a specific organisation and their way of operating. This is not conducive to deriving the most suitable solutions for a whole industry as although the majority of banks will operate in similar way on a large scale, their individual systems and methods will never be identical.

Since each banking organisation implements their own individual systems that are unlikely to completely conform to their competitors, and it is not feasible with both time and access that multiple organisations can be comprehensively analysed using BPM, it was determined that the use of a generic model would be appropriate. This would allow for ‘typical’ activities that a bank undertakes to be identified without the inclusion of bias towards any one particular real world organisation. The fact that a generic model would be used is the primary reason as to why System Dynamics was not selected as the primary approach. System Dynamics uses tools such as influence diagrams and quantified modelling to identify appropriate internal and external influencing factors within an existing system. These factors have distinct relationships between them that determine the behaviour of the

system over time. While this approach would be ideal to determine why banks are suffering from a perceived negative view from the public, it again focuses on a specific system or individual bank as each will have slightly differing factors that may be determined by location or amount and demographic of customers for example. System Dynamics also does not allow for the analysis of individual activities within a system, which is required to be able to derive suitable recommendations for possible automation of these activities.

Once it was determined that a generic model would be used, SSM was primary candidate for the approach to be selected as it allows for the development of models when given a description of the purpose of the system in question. In essence, SSM allows for non-real-world or generic organisations to be modelled and analysed and this meant it held a significant advantage over the other methods considered. Although each bank will operate in different ways, they will all have common goals and will have to work within similar environmental constraints, such as regulations and the effect of the economic climate. Identifying the necessary activities to allow banks to achieve their goals will then allow for the model to be exploited and analysed to determine the scope for possible automation. The Enterprise Model approach was instantly identified as an appropriate solution as this allows for not only the core purpose of a bank to be modelled, but also the supporting, linking and controlling activities that encapsulate an entire organisation, through the derivation of a number of relevant root definitions. Once modelled, the SSM approach will prove its worth as the identified activities can then be compared to the real-world activities, as well as identifying the structure and the type of decisions involved in each.

As powerful as SSM can be, it must be recognised that a number of obstacles may be faced when using this approach. While generic models can easily be constructed using SSM, their overall value and appropriateness for problem solving is still questioned. The generic model will reflect the overall goals of entities within the banking industry but it may be difficult to map the resulting model onto each of the real-world organisations. As a result, extensive validation will be required post-modelling to simply identify the 'correctness' of the approach used and resulting model. Secondly, although SSM is able to identify the necessary activities within a system, it is not interested in the physical design of each of these, which as previously mentioned, may see significant difference from one bank to the next. As a result, SSM is more of a guide towards finding the possible solution, or in this case the scope for automation, rather than identifying the solutions themselves.

In comparison with the other methods considered, I have far more experience using SSM and therefore it would be possible to use this experience to derive richer conclusions from the implementation of the approach. The previous use of SSM had created a framework of mental models which could be exploited to ensure that this implementation of SSM followed the correct procedure and most likely improve on that previous work through reactive learning.

As a result of the ability to create appropriate generic models for the type of problem faced and the knowledge of the approach, SSM was chosen as the primary approach to be used throughout this project. However, while SSM alone is a valuable tool, it must be supplemented by a number of other methods to generate the required results.

Supplementary Approaches

As mentioned previously, the relevance of a generic model to a particular organisation is questionable and is an area that will require investigation in order to validate the model. Since being employed by Lloyds Banking Group (LBG), I have built up a significant list of contacts in various departments of the organisation. Being able to exploit these contacts in the form of interviews for their opinions on the project and more importantly the eventual model will allow the model to be validated to show that it truly reflects the activities within a banking system. However, gaining feedback solely from individuals within one organisation can lead to considerable bias and the result that the model does not relate to other banks. If this was the case, the model could no longer be considered 'generic' and would only be suitable for one organisation, rather than the entire industry. To counteract this, interviews will also be conducted with individuals in other banks. For example, I have personal contacts in the Principality Building Society, while a number of former colleagues at LBG have only recently moved to Santander. It is these former colleagues who will hopefully prove to be particularly useful as they hold the experience of working for two different banks and can relate the operations of both to show whether or not a generic model of an organisation in the banking industry is applicable.

While interviews can ascertain whether the model is relatable to multiple organisations in the banking industry, the selection and implementation of the approach also needs justification. In order to achieve this, I plan to utilise the help of a fellow student, who has a similar amount of experience in the field. By gathering a second opinion on the way SSM has been used as well as on the resulting root definitions and enterprise model, the results will be more justifiable and provide the reader with additional confidence with the outcomes.

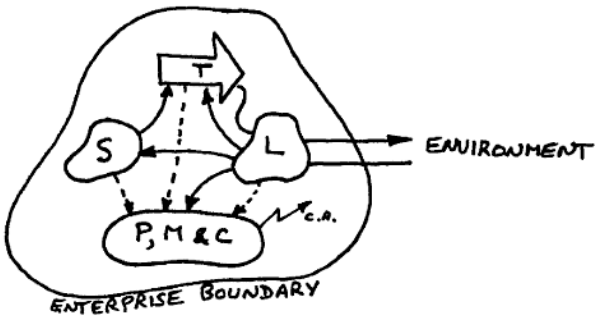
SSM APPLICATION

Soft Systems Methodology is an extremely powerful tool when applied correctly to the given situation. As this project is based around the analysis of a model of a generic organisation, a Consensus Primary Task Model (CPTM) approach was deemed to be most suitable to capture the wide range of purposes and activities that banks are involved in. One

of the methods of developing a CPTM is Enterprise Model assembly, where the organisation is essentially described in four types of system. These are:

- The Transformation Process (T) – this represents the core purpose of the system.
- Support (S) – The activities that support or facilitate the transformation process.
- Linking (L) – The activities that link the organisation to its environment.
- Plan, Monitor and Control (PMC) – Activities to manage the system and control its destiny.

The diagram below, taken from Brian Wilson's book Soft Systems Methodology: Conceptual Model Building and its Contribution [30], show how these four types of systems function together.



One aspect of SSM which is often used is rich picture building where all entities related to the organisation are included in the diagram and the relationships between them are highlighted. A rich picture is a useful tool in describing the current state of a real-world system but it is the real-world aspect that makes it unsuitable for the development of a generic model. While all banks may operate in a similar fashion, there will be slight differences between the internal and external entities that make it impossible to define a single situation for use in a generic model. For this reason, it was determined that the development of a rich picture before the Root Definitions and Enterprise Model was not suitable.

In the case of a fictitious generic bank that is relatable to the real-world organisations in the banking industry, considerable research and use of personal experience was vital to derive a multitude of appropriate 'purposes' that relate to the transformation, support, linking and plan, monitor and control activities of a bank. These purposes could then be used to produce a list of suitable Root Definitions that fully encapsulate the activities of a bank.

Before the construction of the Enterprise Model can begin, a list of candidate activities can be derived solely from the Root Definitions. This is done by dissecting each Root Definition to determine the activities required to allow the purpose to be fulfilled. Each of these activities is then placed in a spreadsheet, so that duplications can be easily identified and eliminated. Once the list is created, it will then be possible to assign each activity to a candidate subsystem, such as 'Human Resource Management' or 'Constraints

Management', and it is these subsystems that will form the basis of the Enterprise Model. Since there are a large number of activities involved, a subsystem diagram will then be created to show the possible layout of the systems and how each will interact with those around it. While this is not an official part of the SSM methodology, it enables the final construction of the model to progress more smoothly. From past experience, much of the trouble encountered when drawing a conceptual model is attributed to the layout of the activities and therefore a subsystem model outlining roughly where each subsystem should be placed based on its links with other subsystems improves this process. Construction of the Enterprise Model can then take place with the layout of the subsystem diagram effectively being used as a blueprint for the model.

The validation of the resulting model is an important stage of the project as the use of a model that does not relate to a real-world bank means that the conclusions to be derived may be unsuitable. Therefore, validation will take place through three separate means. Firstly, the SSM approach used and the Root Definitions and Enterprise Model that were created will be evaluated by another student to determine whether the application of SSM was both suitable and correct. Secondly, research will be conducted and assessed as to the worth of generic models, especially when being analysed for potential improvements to real-world systems. The final stage of the model validation will take place through the use of interviews with existing banking professionals. I plan to ask approximately five or six contacts within various banks for their opinion on the model itself and how it can relate to their own bank. Since the subsystem diagram is far more likely to be understood by the bank employees within the limited interview time, it will be the primary tool used for the discussions. The benefit of the subsystem diagram is that is clearly states the subsystems involved in a generic bank and the inputs and outputs of each of these. The full Enterprise Model will also be on hand for any specific questions and to show sample activities, but will not hold the primary focus. Since these interviews will be a valuable source of information, questions will also be raised about how the individual believes automation is currently achieved in their bank and what they would like to see automated in the future. The output from these three stages of validation is likely to include some changes to the Root Definitions and Enterprise Model but once these have been correctly applied, the model will be ready for the analysis of the activities.

Analysis of the validated model will take place by assessing each activity in turn and determining whether it can be automated and what the expected costs and benefits would be. This analysis will be laid out in table format with each activity residing in a separate row. The table headings to be used will all relate to the aim and research questions that this project is trying to answer, which were described in the Background and Further Research section earlier in this report.

Each activity was analysed in turn to determine how it was currently undertaken in real-world banks, whether or not the activity involved the use of programmed decisions and

whether it can realistically be automated and the associated costs and benefits of doing this. To determine how the activity was undertaken, I used a combination of my own experience of working in a bank branch environment as well as a finance department, feedback from current bank employees from a variety of high street banks, extensive research and an element of sound judgement based on facts or perceptions of a situation. Once it is determined how an activity is currently carried out, it will be possible to identify whether it involves elements of programmed decisions that make it a candidate for automation. Each case of potential automation will bring a number of costs or benefits along with it and these will also be identified as they will help determine the final set of recommendations.

SSM DELIVERABLES

The SSM approach used throughout this project resulted in a number of required deliverables being produced to allow suitable analysis to take place to permit justifiable conclusions. Each deliverable of this process is described below.

Root Definitions

After the required background research on banks and their goals and objectives was undertaken, early attempts at the range of applicable Root Definitions were made but they all had flaws. The majority of the mistakes that were made were based around incorrect wording of processes in such a way that the task was impossible. An example of this was '*A system to maximise distribution of financial services products'.* The issue with this statement is that it is almost impossible to maximise distribution of this kind as there will always be other customers to target while existing customers will also move on. A more suitable statement for this purpose is *'A system to maintain desired levels of distribution and adoption of financial services products'* as this objective is more achievable and allows for alterations in the desired levels of distribution and adoption. Other faults with the earlier versions of the Root Definitions were the complete omission of major banking systems. This was shown when the aspect of customer service and transaction processing was only added to the range of Root Definitions during the fourth iteration. The final post-validation Root Definitions will be discussed later.

Subsystem Diagram and Enterprise Model

Once the Root Definitions were finalised, a list of candidate activities and potential subsystems was then drawn up to allow the construction of the subsystem diagram and

Enterprise Model to take place. The subsystem diagram was used to assist the layout of the main model as the complexity and amount of activities would make this a challenging task. The subsystem diagram was also used as a discussion tool in the interviews as its content and appearance was easier to communicate to the bank employees in the limited time available.

The subsystem diagram is shown in Appendix B.

Prior to the validation stage, the first version of the Enterprise Model was also produced and taken to the validation interviews as a reference guide if required.

SSM Validation

To be able to fully justify any results and recommendations that are derived from this project, both the application of the SSM approach and the resulting products required validating and this took place via a number of methods.

Student Validation

While I often sought the advice of more experienced individuals in the field of SSM throughout this project, I also asked a fellow student, Sowdagar Badesha, to validate that the approach used was 'correct' and appropriate. This type of validation was seen as suitable as the individual had had a similar amount of experience with the methodology and could relate to the approach taken.

This student validation is included in Appendix C.

The validation report primarily focused on the relevance of the approach in creating a generic model and the procedure used to achieve this. The student states that the overall implementation of the method was sound and should lead to the derivation of justifiable recommendations.

Research Validation

As a way of supplementing the student validation and ensuring that the use of a generic model is appropriate, some further research was conducted into the use of generic models for the purpose of improvement and the relation of a generic model to real world organisations. The main points gathered from this research were covered in the Background and Further Research section of this report and reside around the fact that the use of generic models reduces the complexity of a situation and multiple examples of highly regulated systems tend to structure their operations in similar ways.

Interview Validation

After it was determined that the approach used throughout this project was appropriate for the aims and was conducted suitably, a number of interviews with existing bank employees were set up in an effort to gather feedback on the Root Definitions and Enterprise Model as well as a sample of activities. These interviews were also used as an opportunity to gather experienced insight into the use of automation in their respective banks and what their opinion on further and future automation and its possible benefits is.

The interview responses are documented in Appendix D.

The majority of the interviewees agreed that the model was accurate on the whole with a few exceptions. A number of them argued the case for some form of information security system due to the nature of the data used in banks. Most interviewees also suggested some other changes to activities that were relevant to their particular field of work but these were not considered to be major developments. After determining that the Root Definitions and Enterprise Model subsystems and activities only require minimal tweaking, the focus of the interviews shifted towards the gathering of opinions of automation.

Required Changes

After collating the results of each type of validation exercise, a number of required changes were identified to the SSM products that had been created. My experience of working in a bank and the research undertaken meant I was fairly confident with the Root Definitions that had been derived up until that point. This was backed up with the fact that all bank employees agreed with the main points of each Root Definition and although one person did question whether banks simply aim to cover the costs of operations rather than 'be profitable organisations', a valid counter-argument could be produced stating that no one individual can be placed in charge of 'making a profit'.

The most significant change that was highlighted by the bank employee interviews was the need for an information security system within the model to ensure the security and integrity of the organisation's information assets. An additional Root Definition and appropriate activities were defined to include this aspect of the system in the final Enterprise Model.

Most other changes suggested by the bank employees were rejected because they were examples of real-world systems that either did not apply to a generic system or they were a smaller part of other systems that were already defined. Examples of this would be the finance department employee suggesting the need for an operational finance subsystem as well as the overall financial management subsystem and a branch manager proposing the

need for a separate legal subsystem. Eventually these were not deemed necessary as a financial subsystem and constraints subsystem can incorporate all relevant activities.

Post-Validation Root Definitions and Enterprise Model

The final versions of the Root Definitions and Enterprise Model incorporated the required changes that were identified during the validation process. It is only at this stage that the Enterprise Model is recognised as being complete, relevant and valuable as a generic model.

The post-validation Root Definitions are included in Appendix E and the final Enterprise Model, along with the numbered list of subsystems is included in Appendix F.

Activity Analysis Table

Each of the activities included in the final Enterprise Model were inserted into an activity table and analysed on a number of aspects, such as how the activity is currently undertaken, if it involves programmed decisions and if automation is possible and the associated costs or benefits of doing so.

The activity analysis table is in included in Appendix G and will be evaluated in the following section.

EVALUATION

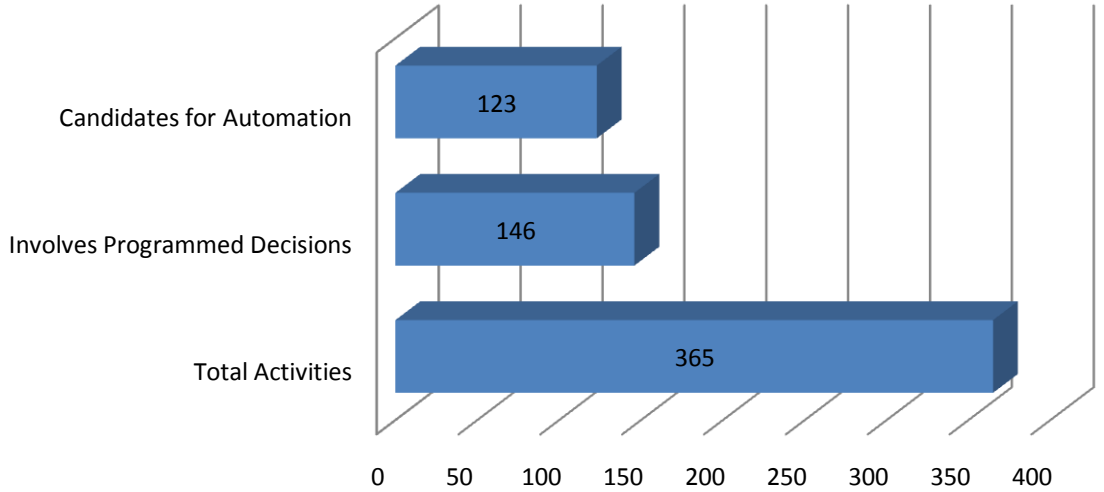
By using the output from the analysis of activities and supplementing this with valuable feedback provided by the bank employees, a useful set of results have been determined that will allow appropriate and justifiable recommendations to be made later on in this report.

The interview process showed that the Root Definitions were sound and accurately reflect the objectives of a banking organisation, albeit from a generic viewpoint. The interviews also served as a way of gathering vital opinions from knowledgeable individuals about the current levels of automation and the prospect of further use of automated processes. In total 6 people were interviewed from a variety of banks and roles and the most surprising outcome of these questions was that each person had a different opinion on the current levels of automation that they see. A Santander Banking Advisor was happy with current levels while an employee doing the same job at Halifax stated that recent automation had

still caused levels of paperwork to increase and was a threat to their long term job security. A Principality Mortgage Underwriter recognised that their organisation is trailing the major banks in terms of technological developments and therefore had more scope for automation in the near future. The Halifax Customer Manager that was interviewed believed that many processes, both back office and customer facing, could benefit from automation and there were far too many manual processes currently in operation. A contrasting view to this came from the Settlements Manager at Lloyds Banking Group who believed that there had been too much automation to the point where there is little scope for any more major processes to be automated. Finally, a Reporting Manager was somewhat happy with previous automation attempts but was waiting for the continuing development of an automated reporting tool to be completed as this would significantly reduce the workload required for report construction and allow more focus to be put on improving the quality of the end product.

The information gained from the interviews also included feedback on how some activities are currently carried out in banks and this was used to help construct the activity analysis table shown in Appendix G. Each of the activities were analysed to identify if they consisted of programmable decisions or algorithmic steps that could indicate whether automation was possible. By carrying out this analysis, it was determined that approximately one third of the activities have the potential for partial or total automation, shown below in Figure 1. However, while theoretically possible, automation of many of these activities can be ruled out because of a variety of factors including the rarity of the activity taking place, the minimal effect it has on a larger, manual process or the requirement of some management input into the decision-making process.

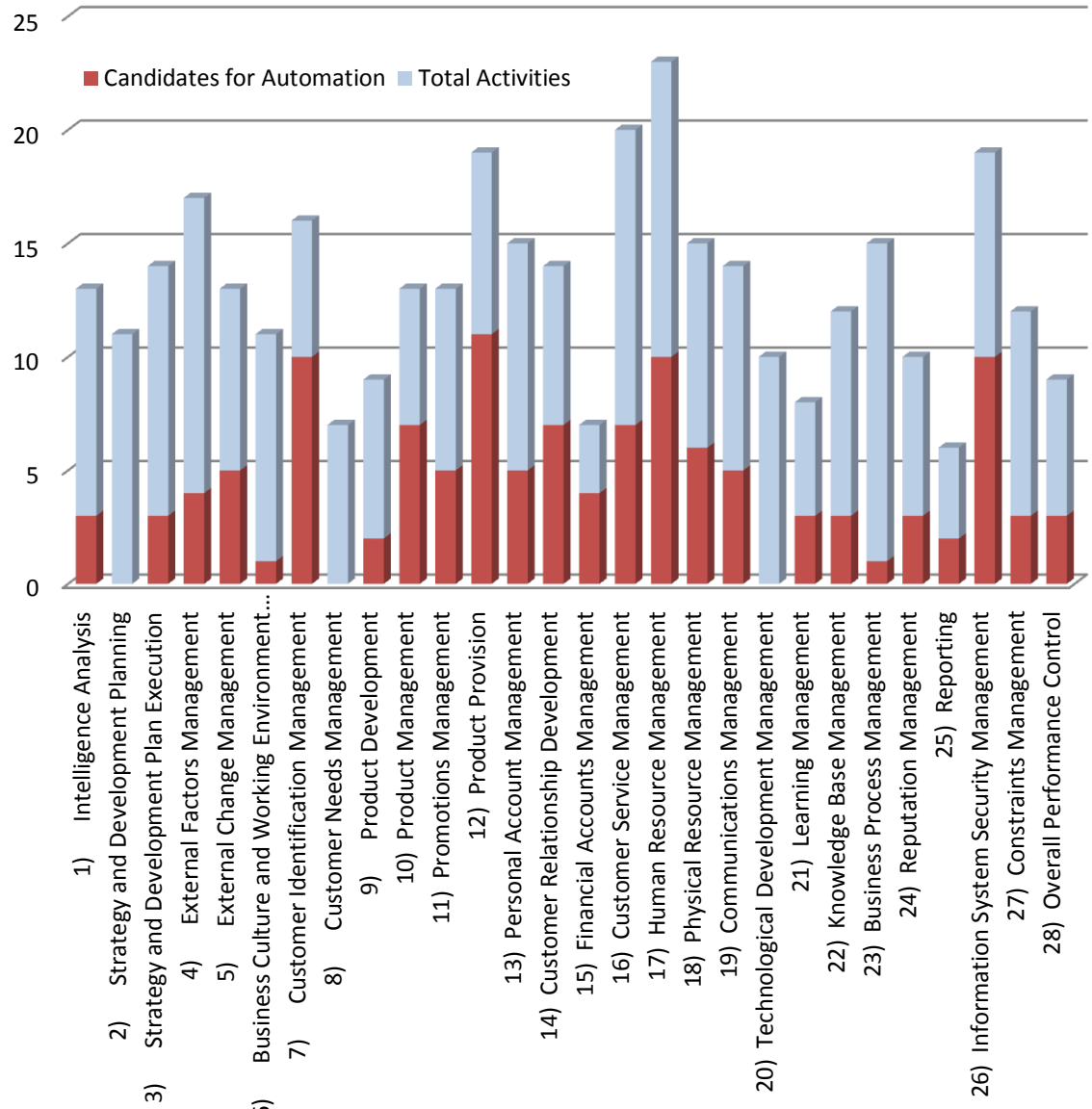
Fig. 1: Potential for Automation in the Generic Bank



Firstly, there are a number of subsystems that exist in the generic banking system that are not conducive or are simply inappropriate for process automation. These include those systems that relate to the strategy of the organisation (i.e. subsystems 2 and 3) and any systems that require significant management input, such as the management of the business culture and working environment or the overall performance control for the organisation. In each of these subsystems there are some activities that include some form of programmed decisions, but they tend to be based around the monitoring of performance levels or conformance with requirements where this simply requires the comparison of existing levels to defined targets to determine whether the system requires some control action. In fact, a significant percentage of the activities that have been identified as potential candidates for automation are those monitoring activities that involve the comparison of two sets of numerical data with the view of determining whether the system is performing as expected. This is because the comparison of data can be achieved by undertaking a series of programmable steps in order to make an appropriate decision. While a significant amount of monitoring activities are candidates for automation, only a small amount of 'take control action' activities were deemed appropriate for automation. These are the activities that, based on the output of the monitoring activities, identify the need for some form of action to occur to ensure that a particular system operates the way it should be. Only a small number of these activities were recognised as candidates for automation as most of them required some form of manual or even management input to rectify the situation, possibly by developing a solution to a problem that was previously unknown, such as why a system no longer conforms to certain regulations. The types of control action activities that could potentially be automated are those where the majority of that particular system can also be automated, such as the Information Systems Security Management subsystem that will be discussed in more detail later.

The number of activities and the amount of automation candidates are split according to each subsystem and shown in the graph below in Figure 2.

Fig. 2: Candidates for Automation - Split by Subsystem



Some notable outcomes from this analysis is that only three subsystems have no candidates for automation; Strategy and Development Planning, Customer Needs Management and Technological Development Management. As mentioned previously, the activities involving the strategy of the organisation are of the highest importance and require the input of senior management, if not the Board of Directors. The strategy of an organisation is dependent on the desires of the Board and shareholders and the environment within which it exists. This will require significant development and agreement between all parties and has long-term relevance for the organisation. As such, no pre-defined solution will be

available to allow any form of automation to take place. The Technological Development Management system will require extensive manual input as although the results of this subsystem may be the implementation of new, automated systems, the technology is new to the business and will require large amounts of analysis to determine relevance for any or all parts of the organisation. Since these developments will be previously unknown, there will be no way to program a process to carry out this task effectively.

It is also interesting to note that three of the subsystems with the highest proportion of automation candidate activities are those that are already automated to large extent in banks today, such as Product Provision, Customer Identification Management and Customer Relationship Development. Product Provision has been partially automated in all major banks in recent years as the use of online banking has become more prevalent. The online processes allow customers to apply for the desired products and carry out the necessary suitability assessments that still occur when customers use the more traditional methods of telephone and branch appointments. The interviews with bank employees showed that the identification and distribution of 'offers' for existing customers in order to develop the relationship and increase product holdings is largely already automated and this is reflected in the results. Substantial research was carried out to identify existing automated solutions that were relevant to the types of activities that take place in a bank today. During this research, software from a company called Quant Interpretations [36] was shown to be able to produce a customer profile in seconds to show a potential product need and initiate the sales targeting process, all of which are activities present in the subsystem of identifying potential customers.

Another subsystem with a large proportion of automatable activities is the Information System Security Management subsystem that was recognised and included only after the validation stage of the project. There are a variety of IT solutions available to businesses that offer a suite of tools from the assessment of current processes to identify the required controls to the implementation and monitoring of these controls to ensure ongoing security. Alongside the IT controls, a number of manual information security controls will be required, such as paper or computer hardware disposal facilities, and it is these activities that will always require mainly manual management.

As well as the previously mentioned solutions, automated systems can be found for reporting, policy production and human resource management. Lloyds Banking Group is currently developing their own automated reporting tool as they have recognised the benefits such a system will bring. They currently employ whole teams of individuals whose primary role is to produce the reports that the business requires on a regular basis. By automating this type of system, the task of collecting the data and arranging it into a suitable format can be taken away from an employee, allowing them to focus more on improving the quality of the end product and the commentary that often accompanies it. Similarly, appropriate employees are made responsible for the production of relevant

policies throughout the organisation. However, one automated tool that was found showed that by recognising the constraints of a business and inputting into an automated policy production system, suitable policies can be output that ensure conformance with all factors. One major issue that was identified with this type of system was that while policies are not created or amended on a daily basis, senior management will usually like to have significant input on policies that can define how the organisation operates.

A large proportion of the activities within the Human Resource Management subsystem were identified as possible candidates for automation as many of them involve decisions based around programmable decisions. Examples of these include the regular testing of employee capabilities to determine whether further development is required, which can be achieved through the circulation of appropriate knowledge tests using a Learning Management System and the allocation of activities to personnel based on their identified capabilities.

While a proportion of the activities have been identified as possible candidates for automation, the results do need further analysis before they can be translated into a real-world banking organisation. For example, many of the activities in the generic model are not specific to what occurs in the real world, such as the opening of a particular account. In reality, banks offer a wide range of products from savings and banking accounts to mortgages and life protection. Each of these products has varying levels of regulation that often dictate whether it can be made available to customers on the already automated online banking systems. Another example of this is the monitoring of the performance of the organisation as a whole. Often major banks are segregated into various business functions and in the case of Lloyds Banking Group, the systems used in each business function are not explicitly linked in such a way that caters for the automated collection of the relevant data needed to assess the overall performance. As such, the collection of the data is undertaken by teams in each business area and forwarded on to the Board, who are entrusted with overall responsibility.

A further area in which the results can be improved is with additional focus on the costs and benefits of automation in each individual case. When the analysis was undertaken, the identified costs and benefits were often generic and high-level and include examples such as ‘automation will reduce the human resources needed to carry out this activity’ and ‘automation will carry out this activity more consistently, efficiently and in less time than the manual process’. By identifying more specific details for each case for automation, the overall results and the conclusions derived from them will have a greater impact and meaning to any relevant banking individual who reads this report. This is an area which will be highlighted in the Future Work section of this report.

The results that have been derived from the analysis are complete and relevant to the banking industry today and I have confidence in them, up to a certain degree. The Root Definitions and Enterprise Model that were created were validated be several parties and in a variety of ways, however the only subsystem that was added post-validation, the Information System Security Management subsystem, has not undergone any form of validation. I do not consider this a problem as I have confidence in my ability to develop suitable Root Definitions and be able to construct an appropriate model based on this. While the results of the project are complete, there is no doubt that they can be improved through additional analysis of the costs and benefits of automation of each activity while numerically displaying some of these aspects will add further weighting to the results.

Overall the goals of the project have been achieved to a large extent. The aim was to identify the scope for automation and the viability of each case through the development and analysis of an appropriate model of a generic bank. Extensive research was carried out into related areas of the banking industry and automation, while the value of generic models was also investigated. The resulting model was validated as appropriate before the thorough analysis of each individual activity was carried out. A notable point that was picked up during research into the banking industry was that many customers do not like the fact that banks are becoming more automated and they wish to see a more personal and caring side from the people they entrust their money with. This is an important factor and will influence any recommendations that will be made with the final conclusions. However while the initial goals were met, as mentioned previously the results can be improved through further analysis that can be undertaken to extend the lifetime of the project.

Although the project has managed to meet many of the goals that were initially set, the way it has been achieved did not closely follow the original plan that was outlined. The first major difference was the way in which the SSM approach was applied to the project. The initial plan outlined that the Root Definitions would be followed up with the development of the Enterprise Model and the task of compiling the activities from the Enterprise Model would take place afterwards. However, in reality, once the Root Definitions were developed and finalised, a list of candidate activities and the potential subsystems were produced as this allowed any duplications to be easily recognised and removed. The resulting final list of activities and subsystems were then placed into an appropriate Enterprise Model only after the creation of a Subsystem Diagram, which was also not originally planned. This stage was deemed necessary as the sheer amount of activities meant the construction of the Enterprise Model was highly challenging, but this diagram allowed the appropriate placement of each subsystem to be identified, therefore reducing the complexity of the links between subsystems in the final model.

The purpose of the bank employee interviews also altered from what was originally intended at the outset. While the interviews were originally going to be based around feedback for the final recommendations to allow suitable conclusions to made, they were actually primarily used for validating that the generic model is applicable to their particular bank. This was an important point as without the agreement from the bank employees that the model was relevant, any recommendations or conclusions derived from it may not be justifiable in the real world. The interviews were also used as an opportunity to gain insight from professionals about their opinion of automation in their bank.

A major omission from the original plan was the three weak Easter break that takes place during the Spring Semester. As it turned out, the vast majority of the work for the activity analysis and Final Report was carried out during this time period as there were fewer lecture and coursework commitments, meaning more time could be put into achieving the project's aims.

Appendix H shows the original project plan in the form of a Gantt chart with the actual progress, including the previously missing Easter break, also plotted for comparison.

The project diary that was updated throughout, shown in Appendix I, also highlights that the actual work carried out was not evenly separated across the length of the project, with the vast majority coming in the second semester. Following the plan more closely would have potentially allowed for more extensive analysis of the activities to be undertaken, which in turn could lead to richer conclusions being made.

Summary of Results

The table below summarises the scope and viability of automation within each subsystem using the information gained during the research stage of the project and the analysis of each activity.

SS No.	Subsystem (SS)	Scope and Viability of Automation
1	Intelligence Analysis	Automated intelligence gathering and assessment tools are already implemented in banks today and are becoming essential in order to remain competitive.
2	Strategy and Development Planning	Activities involving the strategy of an organisation have long-term and significant relevance on how the organisation as a whole operates. Therefore this requires the input of the Board of Directors or other appropriate senior management.
3	Strategy and Development Plan Execution	Activities involving the strategy of an organisation require the input of the Board of Directors or senior management. These individuals may then pass instructions down to lower management but these actions will also require a manual effort.
4	External Factors Management	Risks and opportunities can potentially be identified by automated intelligence systems but major decisions will likely require management action in order to derive the best solution for the organisation.

SS No.	Subsystem (SS)	Scope and Viability of Automation
5	External Change Management	External changes are likely to require previously unknown alterations to existing processes that will require manual development. Automated testing and compliance tools can check if the new processes conform to requirements.
6	Business Culture and Working Environment Management	This will involve the identification of senior management desires regarding the culture and working environment. This is often an intangible asset and will require a manual assessment.
7	Customer Identification Management	Potentially using input from automated intelligence systems, dedicated customer profiling software can generate a detailed profile in seconds and initiate pre-defined targeting procedures to attract the customer to the organisation.
8	Customer Needs Management	The overall range of customer needs will not see regular change. However the most prominent need at any one time may change and identifying this need is of high value to the performance and strategy of the organisation. Management are likely to make these decisions, but may use output from automated intelligence systems.
9	Product Development	While automation is possible, in order to remain a competitive and innovative bank, new products will need to be developed regularly, meaning automation is not desired.
10	Product Management	Automated monitoring of product performance can be used to determine whether new targets or changes to the product itself are required.
11	Promotions Management	The activity of marketing the organisation and its products often requires the input of specialist teams. Forms of promotion that are regularly used include the development of posters and television and radio advertising, which cannot be automated.
12	Product Provision	This is already automated through online banking channels but many customers will not be receptive to further automation to the branch network. It is a fact that this viewpoint generally resides with older customers, but alienating this customer base would have a significant impact on the organisation.
13	Personal Account Management	This is already automated to a large extent through online banking channels but some transactions will always require interaction with bank employees. Many customers will not be receptive of further automation to the branch network. It is a fact that this viewpoint generally resides with older customers, but alienating this customer base would have a significant impact on the organisation.
14	Customer Relationship Development	Much of this system is already automated through the generation and distribution of offers for individual customers. However research has shown that the most successful form of customer relationship development is still through the manual selling of products, either through outbound calling or in a branch environment.
15	Financial Accounts Management	Automated financial information recording tools are essential given the size of today's banks and are already in use. Automated systems can also statistically analyse data with the view of generating more appropriate financial targets.
16	Customer Service Management	Many customers will not be receptive of further automation to the customer service aspect of their bank as it removes the 'personal' touch from the experience that often gives them confidence in the organisation. Complaints will also require individual analysis as each case must be treated on its own to

SS No.	Subsystem (SS)	Scope and Viability of Automation
		derive the right solution for that particular customer.
17	Human Resource Management	Automated Human Resource Management Systems (HRMS) are currently in use and deal with activities such as payroll and recruitment. Employee training is often carried out via automated Learning Management Systems (LMS). Automated allocated of activities is possible based on the comparison of activity requirements with the level of employee, their associated training history and the results of capability assessments. An activity such as 'disposing of personnel' is a sensitive issue and will require some management input.
18	Physical Resource Management	Although this involves similar activities to the Human Resource Management subsystem, a physical assessment of each resource is required to determine suitability. Enterprise Resource Planning (ERP) systems can offer some automated solutions such as purchasing.
19	Communications Management	Although this involves similar activities to the Human Resource Management subsystem, a physical assessment of each resource is required to determine suitability. Output from automated intelligence systems may be used to determine the communication requirements of the business.
20	Technological Development Management	Automation is not feasible in this subsystem as it deals with new technology that was previously unknown and therefore appropriate decisions cannot be programmed. This means that each instance of relevant technology requires analysis by a suitably skilled and knowledgeable individual to determine if it and how it can be exploited by the organisation.
21	Learning Management	Automated systems currently exist to distribute prior learning to appropriate personnel but the actual learning is often the result of past experience. Therefore the identification and collection of learning is often a manual process.
22	Knowledge Base Management	Automated knowledge base tools exist in banks for employees to query when required. However, it is difficult and most likely unfeasible to cover every possible topic or situation that may occur in a banking environment. Therefore some suitably experienced personnel may be required to answer the rarer or more complex queries that could arise.
23	Business Process Management	Determining the objectives of activities is a task for management, while the physical setting up of the necessary processes is normally a manual activity carried out by an operations team.
24	Reputation Management	Reputation that is measured using numerical data can be monitored by an automated system, but this eliminates the consideration of intangible factors that contribute to an organisation's reputation. Also any action derived from this subsystem will most likely involve large scale changes to the way the business operates.
25	Reporting	Many automated reporting tools exist and are currently in use or under development in banks. These can save a large amount of time that is currently spent on the production of reports.
26	Information System Security Management	Automated IT control tools can be used to ensure the security of an organisation's information assets and can continuously monitor the effectiveness of these controls. Using third party solutions can also mean the database of threats is constantly updated. However any physical information security controls will require manual management.

SS No.	Subsystem (SS)	Scope and Viability of Automation
27	Constraints Management	While automated policy generation tools exist, most constraints have a major effect on the operations of a business and will require input from suitably skilled individuals.
28	Overall Performance Control	Automated performance monitoring using numerical data is possible and often implemented in major business. However, any action derived from this subsystem will have significant effects on the business and these decisions will be made by the Board of Directors or appropriate senior management.

FUTURE WORK

While research has shown that the public has not taken a favourable view on banks in recent times, this may not be entirely down to certain decisions that banks make or the way they currently operate. With more time permitting, system dynamics would have ideally been used to try to determine what factors influence the perception that customers have of a bank and how this changes over time. By properly identifying these factors through extensive research and depicting them in an influence diagram, which could later be developed into a quantified model using appropriate software, the root cause of the public's view can be identified. By understanding exactly what causes the current opinion, the problem will instantly be better known and a potentially more suitable solution than determining the scope for automation through an SSM analysis could be derived.

It was mentioned in the Interim Report that although Business Processing Modelling (BPM) was disregarded as the choice for the primary approach for this project, it may still be used on a smaller scale to analyse a selection of processes for the possibility of automation. While the normal technique for BPM is used for the identification of areas of improvement in current processes, undertaking the activity from a data or artefact-centric point of view tends to foster the consideration of automation. This is because the method looks at the information inputs and outputs of an activity as opposed to the actual processes themselves and this can lead to the recognition of a new but appropriate system, which could potentially be automated, to achieve the same goal as the existing system. By taking the activities that this project has identified as candidates for automation, BPM can be applied in the future to develop suitably automated solutions.

Although the application of BPM can potentially be a project in its own right, the scope of this project can effectively be extended in the future to deliver a more accurate analysis of the associated costs and benefits of the potential automation for each activity. The analysis undertaken throughout this project mainly identified generic costs and benefits associated with each case for automation and no numerical data was used. By developing appropriate cost models for the relevant activities, it will be possible to provide interested parties with an extensive breakdown of the real-world costs that can be attributed to be undertaking of

the automation of a particular process. This can be achieved with research into the costs of outsourcing the task to a specialised company or the expense of employing suitably skilled individuals to undertake the task in-house. The intangible costs of automation that would be seen would also need to be fully investigated by analysing the process in question and any change that would be seen along with reviewing numerous case studies into past attempts of this type of process re-engineering.

The original purpose of the bank employee interviews was to gain knowledgeable opinions to validate the final recommendations to be produced from this project. Since the interviews were subsequently used to validate the Root Definitions and Enterprise Model instead, the recommendations, to be presented in the following section, have not been reviewed by appropriate banking individuals. With more time permitting, these recommendations will be taken back to the bank employees that were originally interviewed to gather the necessary follow-up information and thoughts on the viability of each one. By gaining these opinions, the recommendations could be further refined to ensure a greater degree of appropriateness, instantly giving this project more credibility in the real world.

CONCLUSION

At the beginning of this project, the main aim was to identify the scope for automation in banking processes and to determine the viability of each case. A supplementary aim was also to investigate the value of generic models as this subject has not been previously researched in detail before. The research, creation and analysis of the Enterprise Model have given results that meet these aims and these will be reiterated in this section.

There are a number of identified subsystems where automation is simply unfeasible, such as those that involve the derivation and execution of strategy or the management of the business culture or working environment that exists within a bank. Many banks want to be seen as innovative organisations as this enables them to gain a competitive advantage over others. In order to remain innovative and flexible, automation of product development is not desired as this will most likely lead to minimal differences in product appearance and features rather than the creation of a never-before-seen product that will capture the attention of customers. There is limited scope for automation in the subsystems of Physical Resource Management and Communications Management as these contain activities that involve the assessment of physical items to determine whether they are suitable to meet the requirements placed on them. Business Process Management involves determining the objectives of certain activities and developing and implementing the necessary processes to allow these objectives to be achieved. While the monitoring of the achievement of these

objectives is something that could potentially be automated, the actual implementation of these processes will be a largely manual task. The final subsystem that is not conducive to automation is that relating to the exploitation of technological developments. The primary reason that this subsystem is not suitable is that it deals with new technology that was previously unknown. By being previously unknown, it is highly unlikely that an effective program could be developed to assess the relevance and worth of each instance of new technology to the organisation.

As well as those subsystems that are unfeasible for automation, research has shown that, while possible, automation of a number of activities is not desirable as it has the possibility of alienating a large proportion of the customer base. These activities are based around the activities that bank branches currently undertake, such as the provision of products and management of customer accounts as well as the query and complaint aspects of customer service. Although many of these activities are adequately automated through online banking, it is the viewpoint of many customers that further automation of branches would be a poor decision as it would remove the personal aspect of a business that is often the reason why people choose to bank there. The way banks deal with complaints is covered by various FSA regulations and state that each case must be dealt with individually to derive a suitable solution for that customer. Due to these regulations, total automation of the complaint handling process is not possible, although it does usually follow a defined step-by-step procedure.

Despite there being many subsystems where automation is not viable, there are many where automation is already prevalent or highly possible. Intelligence gathering and assessment is already a largely automated process in major banks and this has to be the case in today's business world for a major bank to remain a market leader. Automated intelligence systems are also essential when considering the amount of information that all divisions of a bank have to consider when making decisions. Human Resource Management Systems (HRMS) and Enterprise Resource Planning (ERP) systems are available to businesses and these offer partly automated systems that deal with personnel and physical resources. These types of systems are already in use, not in just major banking organisations, but also in the majority of medium to large businesses.

The primary areas where automation is highly feasible are customer identification, product management, customer relationship development, financial accounts management, reporting and information system security. Each of these areas of the business either have existing solutions available or involve activities that follow a series of algorithmic steps or are based on programmable decisions that mean automation is a distinct possibility in the future, if it is not already present. Automation of potential customer identification can lead to the generation of customer profiles within seconds, while analysing the current relationship of every customer can allow for the generation of suitable offers with the view of developing these relationships. Automated reporting tools can produce suitable reports

far quicker than a manual process with the results also being much more consistent, while automated IT security tools are becoming ever more essential to combat the growing security threats to an organisation's information assets.

While the initial task of achieving the automation may be an expensive and daunting task, the benefits that can be gained from doing so are enormous as long as the possible consequences are identified and accounted for. Despite increasing levels of automation possibly reducing the personal side of a bank, taking customer opinions into account will go a long way to building and maintaining trusting relationships that allow an organisation to progress towards its vision and objectives.

By achieving the majority of its aims, this project has also showed that generic models can be of great value when used in specific situations. The fact that a banking organisation is complex meant that the use of a generic model could reduce this complexity to a point where meaningful conclusions could be derived from it. Also, because the banking industry itself is a highly regulated environment, the resulting generic model is likely to be predominantly relevant to any organisation that has to satisfy these regulations, and this is proved through the validation that took place.

Recommendations

Based on the evaluation of results and the conclusions above, a number of recommendations can be derived for the future automation of banking processes. It is hoped that these recommendations can be used by banking officials to appropriately implement automated systems within their banks while still allowing the organisation's goals and customer needs to be met. The recommendations are as follows:

- To ensure the bank meets the desires of all customers, expand the range of services available on online and mobile banking facilities to cater for customers who are unable or would prefer not to use branch channels, while reducing the scope for further automation in branches as this can alienate a large proportion of customers.
- Due to the significance it has on the overall business, automation of activities that are strategic in nature or consider the overall performance of the organisation is not desirable.
- The monitoring of performance of a wide range of processes can be automated as this can highlight problem areas before the issue causes considerable damage, while also reducing the need for constant manual assessment that is a drain on resources.
- Many major banks already employ automated intelligence gathering and assessment tools that result in comprehensive knowledge of the environment being gained, which allows the bank to better meet the needs of customers and obtain a

competitive advantage. If not already present, this system is essential for long-term success of a banking organisation.

- To improve competitiveness in an ever-challenging market and expand the overall customer base, automated customer profiling and sales targeting systems are essential.
- Although already automated to some extent, a wider use of automation for the development of customer relationships and product holdings is not required at this point as the existing manual processes of using sales advisors and outbound calling is considerably more successful.
- Automated human resource and learning management systems will reduce the personnel resources required to train employees and monitor ongoing capabilities for the allocated role.
- Automated reporting tools should be introduced to ensure the consistency and correctness of the required reports, while also significantly reducing the resources required for the production of reports.
- Automated, and possibility third-party, IT controls should be implemented to ensure the continuing security of an organisation's information assets against changing threats.
- For any processes that are automated, try to ensure that individuals with original knowledge of how the systems operate are available when required. If this is not possible, ensure that comprehensive documentation is produced and kept up-to-date to allow future issues to be solved efficiently.

REFLECTION ON LEARNING

There are many things that I feel I can take away from this project that will improve the way I way I work in the future. This section will review the steps taken over the course of this project and identify any relevant areas where transferable learning could exist.

Despite originally setting out a plan with deadlines for the completion of each stage of the project, I found that the way it actually progressed was much less structured, resulting in too little work done in the first semester and too much left to do as the project was nearing the final deadline. This meant that the during the final five weeks of the project I had to work on an almost full-time basis to be able to complete the project to the current standard and say that the initial goals have been achieved. One of the reasons that the project was in this position was that I often did not undertake any project work for a number of weeks to concentrate on other coursework commitments. While this was not ideal, it was also not a detrimental factor and this meant I could have a concentrated effort on the project once

coursework was complete, while also ensuring that the associated work flow and thinking patterns were not constantly interrupted by the need to carry out other assignments.

One of the most challenging aspects to this project was the development of the range of Root Definitions to a point where they truly reflected the purpose of various banking systems. The first iteration of these Root Definitions were lacking depth and broadness but this was gradually improved on as each new version was derived. The areas for improvement at each iteration could be easily identified and used to build a more appropriate range. The fifth and final iteration of the Root Definitions delivered a sound range of descriptions for the relevant areas of a generic bank and it was these that would be used to develop the Enterprise Model.

The original plan also included the task of compiling the list of activities from the completed Enterprise Model but this was not what eventually took place. After consulting with my supervisor, I was advised of another method that involved the derivation of candidate activities directly from the range of Root Definitions and the compilation of these activities in a spreadsheet before any modelling took place. By compiling the list of candidate activities beforehand, any duplicates could be easily identified and removed, which would make the production of the actual model far less complex. I found that this approach made the task much more manageable, especially when dealing with a large scale Enterprise Model such as this, and because of this I actually used the same method when needing to develop a conceptual model for a piece of coursework in the Systems Thinking module. While I was confident about the use and implementation of SSM before this project began, I found the method used in this project is extremely valuable and would be my preferred approach when using SSM in the future.

My previous experience of SSM led me to start producing the Enterprise Model at this point but with approximately 350 activities identified this was a daunting task. My first attempt at the model was unsuccessful for a number of reasons. Firstly, I was only using A3 paper, where A1 was eventually used, and it was often difficult to identify the output of each subsystem and the links between activities. However, it was at this point that I was introduced to the use of a subsystem diagram. This was not an approach I had encountered before but the benefits it provided were of great significance to the achievement of this task. The subsystem diagram ignored the individual activities and using just the main subsystems within the bank, determined the inputs and outputs of each and the associated links between them. This allowed the general placement of each subsystem in the overall structure of the generic organisation to be defined and following this configuration in the Enterprise Model meant that the majority of linked subsystems were in close proximity. The result of this was a less complex Enterprise Model as fewer systems needed excessive relationships that span across the entire model. Despite the subsystem diagram aiding the development of the Enterprise Model, it still took approximately two weeks to produce the final pre-validated version. Although this corresponds to the original plan, the fact that the

generation of the list of activities took four weeks, as opposed to the planned one week, meant that the project was significantly behind schedule.

Once the list of Root Definitions and a workable version of the Enterprise Model were produced, they required validating to determine that, although they focus on a 'generic bank', they offered some relevance and scope for comparison with a variety of real-world banks. Without these SSM products being validated, there is no basis to say that the results derived from this project are applicable to multiple existing banking organisations. This validation process was carried out through three distinct means; student validation, research into generic models and existing bank employee interviews. The first two methods were relatively simple to carry out and provided validation into the approach used for this project. However, the bank employee interviews were a more difficult task. The sheer size of existing banks meant that any one interviewee is highly unlikely to have knowledge of all aspects of the business that have been identified in the generic model. Also, being able to interview senior management or members of the Board of Directors of a major bank was an unlikely scenario as these individuals are normally located where their bank's head offices are situated, while they also adhere to strict work schedules. To counteract this, I ensured that I interviewed a mix of management, sales and back-office staff in a number of banks to gather a wide range of views that could be used to validate the Root Definitions and Enterprise Model I had created. The interview process identified a number of minor changes to the model and the omission of an information system security subsystem but after the required alterations were made, the analysis of the activities could begin.

The activity analysis stage of the project was a challenging task, both mentally as the task was particularly tedious and with respect to the amount of research required for each activity. Since I was significantly behind schedule at this point and the task involved the analysis of 365 activities, I was required to work on an almost full-time basis for two and a half weeks to get the task done with sufficient time for appropriate conclusions to be made and the Final Report to be written. While I believe that the conclusions and recommendations delivered in this project are valid and can be used in the real world, I have no doubt that the justification behind each case can be improved as well as being able to provide some technical basis for the implementation of automation. The associated costs and benefits of each case for automation in this analysis were very generic, but with more time available, a more detailed look into the intangible costs and benefits as well as the inclusion of monetary values for measurable factors would have been carried out. This would have led to a deeper understanding of the results of automation in specific cases to be able to provide greater rationale for the decisions. As mentioned in the Future Work section, this is an area that should be expanded upon if the lifetime of the project is to be extended.

While this work was carried out using a generic model of a bank as a basis for analysis, a question arises around which other methods could have been used to deliver a similar set of

results. I believe SSM was an ideal choice for this project as it allows for the use of an appropriate reference model as a framework for a single entity within a highly regulated industry, such as the banking industry. Using this reference model means that comparison between it and the real-world activities of several banks can be carried out to determine standard processes and objectives of systems. Identifying these can then allow for the possibility of automation to be investigated, and since the standard processes and objectives will be similar across the industry, any recommendations for automated systems would be relevant to more than one organisation. Without the use of SSM, a similar model could potentially be derived from looking at one bank in particular but there is no guarantee that this would then be applicable to others in the market. Determining the scope for automation could only then be derived from analysing the existing systems and processes in that particular bank, while a similar process would then be required for other banks, thus multiplying the overall work needed to deliver the same results that this project has achieved. The one benefit that analysing existing processes in a bank would have is that smaller processes that are not included in the organisational-wide model can be recognised, meaning a more detailed scope for automation can be derived.

The work that was carried out during this project has somewhat changed my original views that were present at the outset. The major change that has been seen is with my approach to SSM. Beforehand, I had a fixed notion of how SSM was used and thus followed a particular blueprint each time I applied it to a situation. My initial assumption was that a project consisting of substantial research and an SSM analysis would not be a great challenge to overcome but this was quickly proven to be incorrect. The changes to the way SSM can be carried out, which I have gradually seen throughout this project, have also shown me the influence that SSM can have on a problem and the variety of situations it can be appropriately applied to.

This project has also played a major part in the process of reflective learning. I have made numerous mistakes throughout that relate to the application of SSM, as well as other aspects, that I can now quickly recognise and am unlikely to make again, whilst I have also built on past experience to improve my knowledge and capability in the field to the point where I would now be comfortable of tackling problems of any size. My initial assumptions regarding the prospect of automation in the banking industry was that many more things should be computerised and this view was primarily based around my opinion of what it is like to work in this industry. The research that was conducted into the industry, and in particular how customers feel about their banks with regards to them effectively 'losing touch' with what customers want, showed that while automation of many processes is entirely feasible, it is not always a desire of the customers. As a result, attempting to do so may further damage the bond that has been formed over many years.

Overall, I would consider the project to be a success as the original aims have been achieved and the amount of work that has been placed on the completion of this project has been

substantial. The undertaking of the project has allowed me to identify a number of areas of learning that can be used in future activities, both in a professional and personal environment. Upon graduating, I will be undertaking the role of an Audit Associate with a major consulting firm and will primarily be working in the Financial Services sector. This project has allowed me to gain new and improve existing knowledge of banking processes that will be essential to allow me to excel in this type of role. Being able to analyse the way existing processes work to deliver a suitable outcome plays a significant role in the audit service and is experience that I will no doubt readily exploit.

I have also had to vastly improve my research skills to be able to gain an appropriate amount of background knowledge, not only on the banking industry, but on the way process automation can be achieved in order to complete this project to the high standards that I always set for myself. My time management throughout this project could have been greatly improved and this is a lesson that I will take into future projects that I am involved in. While I have always considered my report writing skills to be one of my biggest assets, I have never had to write a report as comprehensive as the one required for this project. Now that I am able to recognise the effort required to produce a report of this magnitude, I can ensure that I am far more prepared when the task next presents itself and be able to allocate my time effectively. At present, I am unaware of how widely SSM is used in the consulting organisation that I will be joining, but in the case of an appropriate situation arising, I would feel confident of explaining the benefits that SSM would bring to solving that particular problem to my superiors and leading the resulting team in the achievement of that task.

These transferable learning skills that have been identified from the overall experience and my performance during this project will prove invaluable in my future activities and I will look back on this project with fondness and a sense of achievement.

APPENDICES

Appendix A - Interim Report

Determining the Scope for Future Automation of Banking Processes

TABLE OF CONTENTS

INTRODUCTION

Since 2007 [1], the banking industry has been in crisis and has suffered from a lack of customer confidence. This has led to a largely negative perception of banks and how they operate. Much of the antagonism shown towards the banks of today are for reasons such as requiring a 'bail out' by the government using billions of pounds of taxpayer's money or charging what can be deemed as 'excessive' overdraft fees. Another area of contention is with regards to the seven-figure bonuses that some executives still receive despite the banks regularly making losses in the billions [2].

Much of the losses the past year have been attributed to the demand of the Financial Services Authority (FSA) for banks to repay Payment Protection Insurance (PPI) as a result of it previously being mis-sold [3]. However, a large share of the recent losses can also be credited to risk-taking actions that the banks undertake with consumer's capital, of which RBS is a prime example and will be investigated as part of the background of this project. These are decisions that are made by the people charged with running the bank and when mistakes occur, the whole economy can suffer as result [4].

With banks already facing an agitated customer base due to these factors, the possibility of human error only exacerbates the issue. Despite the increasing value of the use of technology in industry today [5], many processes within banks remain labour-intensive. Such examples include transaction processing by till operators, complaint handling and financial report production. Some banks, HSBC as one example, offer entirely self-service branches where all transactions are processed automatically while the majority of other major banks now include self service machines within branches. However the bulk of transactions are still executed at counter positions by employees. Complaint handling is an almost entirely manual process with most of the minor complaints handled and closed by the employee at first point of contact. Major complaints or those that require further assistance will be handed off to a manager or dedicated Customer Relations department. Humans play a major role in these processes and the issue with these situations is that they are open to human error or multiple perceptions of the same incident. For example, if the same complaint was taken to multiple bank employees, there may well be multiple different outcomes if each employee takes a different perspective on the situation, the customer or the best course of action to take. These inconsistencies in service can often lead to further complaints being made, resulting in more negative press for the banks.

With technology in banks on the rise, self-service machines currently stand at the forefront of this shift. However there is still much scope for further automation of processes with the aim of the improvement of a variety of aspects. Potential benefits from the automation of processes include improved customer service in terms of both speed and quality, increased consistency of service, reduced costs of human resources and greater overall stability for the bank. While these benefits may be achievable through the automation of a number of

processes, excess computerisation can result in public controversy if it leads to job losses. It can also have a number of other prospective drawbacks, including a reduction in subject matter expert employees, the initial costs involved of automating and a lack of accountability if problems arise. Each of these possible outcomes will be analysed in detail between this Interim Report and the Final Report.

Through automation of everyday processes, the consistency and quality of service seen within could be improved, which may mean a rise in the confidence levels that consumers would have when interacting with banks.

Aims and Objectives

This aim of this project is to identify the viability of automation of a number of processes by identifying the high-level purpose for a 'generic bank' from a variety of perspectives and modelling this standard organisation before analysing the activities and systems that are currently in place. A number of approaches have been considered to enable the aims of this project to be achieved and will be highlighted later in this report. Before recommendations based on this analysis can be made, a number of concepts must also be investigated, such as the validity and value of using general models and how my personal experiences of employment by a bank can relate to other organisations in the industry.

LITERATURE REVIEW

During the early stages of this project, several resources were used to gain a prior understanding of the topics that will be covered. These include Soft Systems Methodology (SSM), automation principles and banking-related literature. A number of these resources and the information they provided are described below.

Soft Systems Methodology: Conceptual Model Building and its Contribution by Brian Wilson (2001, Published by John Wiley & Sons Ltd [Chichester])

When presented with a problematic situation and given the task of making recommendations on how to improve the current system, the use of SSM provides the analyst with a thorough overview of the system, making it easier to spot weaknesses than in traditional 'hard' methods where the problem must be well-defined and have a clear solution. This book presents the advantages that SSM can offer when modelling systems, both in the real-world and in more general terms, which relates to the goals of this project. The banking industry has dealt with a number of problems in recent years and the Consensus Primary Task Model (CPTM) is a powerful tool, allowing each of these to be included within a single model. This single CPTM model can then be decomposed into the various sub-systems, such as strategic management or product selection for example, to create an Enterprise Model. When conducting the SSM analysis during this project, this resource will be particularly useful in determining the correctness of the Root Definitions and the associated models.

Modern Automation by David Foster (1963, Published by Rowse Muir Publications Ltd [London])

Despite first being published in 1963, this book provides a sound clarification on what can be meant by the term 'automation' and how it separates itself from simple 'mechanisation' of processes. David Foster recognised that the concept of automation must simulate human psychic functions in such a way that the process takes on board certain human characteristics, such as memory, standards and intelligence and be optimized to operate as such. He also goes on to explain how the reliability of systems is related to the rigidity of the testing that occurs and how rapid faults are identified when they occur. The greater reliability a system has, the more confidence people will have in using it, the theory of which can be translated to customer interacting with a bank. A further area of interest which is described in this book is the financial aspect of automation, such as the short-term costs of design and implementation as well as the ongoing maintenance costs of operating the resulting system. These costs are compared in detail to the potential benefits that

automation may bring, and it is these benefits that will help justify any final recommendations that are made from this project.

Automation, Production Systems, and Computer-Integrated Manufacturing by Mikell P. Groover (2001, Published by Prentice-Hall Inc. [New Jersey])

In comparison with Modern Automation by David Foster, this book offers an insight into a number of different strategies for automation such as specialisation of operations or combining a number of operations for greater efficiency while it also looks at the different levels of automation, from a basic device or machine level up to the highest level, an enterprise. The enterprise level of automation consists of the corporate information system and is concerned with a variety of aspects of the business, from marketing and sales to research and finance. An area of concern that will be addressed later is with the quality and consistency of service that banks can offer and this book reflects on automation from a quality perspective with discussions on quality assurance and inspection principles and methods.

Why Automate Business Processes by Nigel Leeming (2004, Available at: http://www.ivencia.com/softwarearchitect/articles/bpm/BPM2%20-%20Why%20automate%20business%20processes.pdf [Accessed: 25/10/11])

This paper serves as one part of a set of papers on Business Process Management (BPM) and outlines the reasons for automation of business processes. This paper lists the possible benefits of automation and why is it often required. When businesses grow, their needs often change with it and it is frequently the case that the existing IT systems never completely fulfil these alternate needs. In situations such as this, people generally fill the gap but as Nigel Leeming states “More people doing more work results in more difficulty, more mistakes and more layers of management”. He advocates adding automation to an existing legacy system so that it continues to carry out the processing it is efficient at while new workflows are included. This reduces the people required to carry out the process, freeing up valuable work-hours and increasing the speed and accuracy of the systems.

Business Process Modelling and Automation in the Banking Sector: A Case Study by Mara Nikolaidou et al. (2001, International Journal of Simulation: Systems, Science and Technology 2(2), Available at: http://ducati.doc.ntu.ac.uk/uksim/journal/Vol-2/No-2-Hlupic%20Special/paper-7%20Nikolai/Nikolai%20etal.pdf [Accessed: 25/10/11])

This report from the University of Athens was particularly useful in relation to this project as it focuses on the automation of processes in an existing bank's loan department. The results of this paper identify the types of processes that can realistically be automated in a bank and the activities involved in doing so. While this project aims to assess the viability of automating a number of processes and make recommendations based on this, the paper reviewed here covered the implementation stage of the process too, using Lotus Domino/Notes software to automate the business process models that were created using a specific modelling methodology. Understanding how the automation recommendations could physically be implemented will allow me to add further clarity to any recommendations that are made as these previous examples can be cited.

Improving Customer Service in the Banking Industry: Implementing Automation Around an Integrated Customer Information System by Microsoft (2003, Available at: http://www.washburncommunication.com/services/portfolio/Washburn_Financial_Services_White_Paper.pdf [Accessed: 31/10/11])

This paper from Microsoft identifies how customer service can be improved through automation using Microsoft products. While this paper is effectively trying to sell products it does offer some examples of situations where automation would save both the bank and customer considerable time and money. This may prove particularly useful later in this project where recommendations have to be made as it provides an illustration of a variety of IS and IT solutions, although Integrated Customer Information Systems are already present in banks such as Lloyds, as my personal experiences have shown.

BACKGROUND

Dynamics of the Banking Industry

The banking industry and the economy as a whole resides in an ongoing cyclic trend of booms and busts. The current diverse nature of banks leads them to become more vulnerable to the failure of other banks, a theory which is outlined by Professor Lord Robert May [4]. Lord May states that the banking industry could take lessons from ecosystems, where the system stability is increased through the number of individual nodes and the strength of their interactions. Due to the dependence of today's banks on each other, because of diversification of assets and interbank lending and borrowing, any form of system failure can propagate through the banking system like an infectious disease. These failures can then result in banks becoming unwilling to lend or unable to borrow capital, with the effect of further damage to the economy.

However the fate of banks is not just decided by the economic cycle and links with its competitors. Using Royal Bank of Scotland (RBS) as a case study example, a recent report by the Financial Service Authority (FSA) into the near-collapse of RBS puts many of the failings down to poor management decisions and a lack of proper regulation [6]. Much of the blame has been placed on the former CEO of RBS, who oversaw multiple acquisitions which took the bank to being the fifth largest banking organisation in the world. However, it then emerged that much of RBS' growth was based on poor-quality funding and the bank was too reliant on the economic market, which inevitably would hit a downswing. This failure in the management of RBS cost £45bn of public money and 27,500 jobs. Before the near-collapse, the relations between RBS and the FSA were so strained that the bank refused access to the FSA to review the full extent of its finances, although the subsequent takeovers were still approved [7]. This poor management and lack of thorough regulation which resulted in the near-collapse of one of the biggest banks in the world is just one example of many failings. Recent others include Halifax Bank of Scotland and Northern Rock in the UK and Lehman Brothers in the United States. With history such as this, there is little wonder that the public currently has a negative perception of banks, which only seems to worsen as new financial reports are released [8].

The Problem with People

With an already negative perception of banks existing, the problem worsens when customers have poor interaction with bank employees. Sometimes this may be for a number of reasons out of the employee's control, such as the behaviour of the customer or unreasonable demands, but it can often be attributed to people problems. People problems can be defined as deviations in both performance and behaviour and can be brought on by a large number of reasons [9]. These can include a lack of care or commitment to the role,

personal problems, a confrontational manner or a lack of the necessary skills to adequately deal with a situation, to name a few. Each of these issues is likely to have a detrimental impact on the quality and consistency of service and any end product that is produced. For example, in June 2011, Santander was voted the worst financial services company for the second year in a row [10]. According to Steve Goodheart [11], performance and publicity such as this will undoubtedly drive potential customers away, and in relation to banks, the potential loss from not attracting customers can be devastating.

Automation

A number of the issues mentioned previously could have been resolved or avoided through the improvements and benefits that automation can offer if implemented successfully. One of the papers assessed in the literature review, Why Automate Business Processes? [12], offers a number of proposed benefits of automation including improved compliance, governance, accuracy and processing speed, reduced employee training requirements and greater customer satisfaction. A study undertaken in 1992 regarding the automation of processes in a Brazilian bank showed that the impact of the automation resulted in greater productivity and dampened financial instability [13]. While it would be required on a far grander scale with today's banks, greater financial stability would vastly increase the confidence customers would have of investing their wealth. A recent study on the European debt crisis identified that current consumer confidence levels in France were at their lowest since the height of the recession in 2009 [14].

Despite the potential benefits that can be seen from the automation of business processes, it does have its detractors and consequences. Automation of processes can be seen as a factor in increasing job losses and an example of such automation would include the use of self-service checkouts at supermarkets. Many business leaders see this as a necessary consequence of growth in the pursuit of greater profits [15], but excessive job losses within an organisation can result in a backlash from both the existing workforce and the external public. A study into why humans were so vital after years of automation also brings up a number of interesting points [16]. It can be argued that automation of systems involved in decision-making, for example, can have a detrimental effect if the system is not presented with all of the relevant information or an unpredictable event occurs. In these situations, it may prove beneficial to have people present to assist in the decision-making process. This study also identified possible trust issues between the operators and automated systems. If the operator trusted their own ability to complete a task more than the automated system, they would tend to complete it manually. I have seen this in banks myself where some customers are reluctant to use any of the self-service facilities because they "don't trust machines". For automation to work effectively, this trust must be earned to the degree where customers are happy to use the system and satisfied with the resulting service.

Another area of contention is that constant automation is de-humanising the interactions with banks and their staff, but the fact is that many transactions now take place with the customer looking at a computer. This is emphasized by a 2011 survey by PayYouWay.org which showed that a quarter of British people with internet access use online banking facilities every day and nearly 40% use them weekly [17]. A popular tactic to bring the remaining doubters on board is to try to humanise any interaction that takes place between a user and a computer to build up the confidence and satisfaction of using the automated system. Examples of achieving this include personalisation of the interface or configuring the system so that it seems as if it has the user's best interests in mind, as opposed to simply offering rigid instructions for use [18]. The case study of automation in a bank loan department, shown in the literature review, shows that successful automation in financial organisations can be achieved if the correct processes are selected.

When conducting research into possible automation solutions, it became apparent that many companies are already offering business process automation services. A selected few are described below.

- Microsoft [19] – This products promises to offer prospective clients increased productivity and operational excellence and better decision making through two main solutions that Microsoft call 'Channel Renewal' and 'Payments'. The former focuses on implementing reusable components when channels, such as ATMs or branches, are renewed leading to more consistent customer experience and reduced costs while the latter offers standardisation of payment processing and archiving, resulting in reduced system complexity and increased customer knowledge.
- AutoMate [20] – This product offers automation of data transmission between relevant parties within a financial services environment, ensuring the transmission is reliable and secure, as well as automation of a number of other business processes. A case study included on the company website states that a previous AutoMate client credits this product for saving 400 hours per month in IT costs after the automation of website monitoring tasks and database audits.
- TIBCO [21] – The Business Process Management software offered by TIBCO is used to automate back office processes and has already been used by a number of banking organisations. Examples cited by TIBCO include the automation of 300 back office processes in a large European bank which affected 3000 end users but is now seen by the bank as an area of operational excellence. Resulting benefits from the automation include faster turnaround of customer requests and reduced human resource costs without a drop in the quality of customer service due to increased efficiency.

Each of these solutions refers to a number of possible benefits from implementation but the chosen solution must be suitable to the activity in question and this will be explored later in this project when an SSM analysis is conducted.

Academic Questions

While the aim of the project is clear, a number of questions have arisen which may hinder the validity of any recommendations that are made as a result of the analysis to take place. Using my own experiences of employment with Lloyds Banking Group (LBG) will prove to be a great help throughout this project in both analysing the existing processes and making recommendations but it has to be determined whether these experiences relate to other banks or if they are specific to LBG. I am fortunate enough to have built a number of quality contacts within LBG that I plan to use to gain further insight into areas of the business that I have not had a great deal of experience of working in. In addition, I have a number of former colleagues now working at Santander that I will be able to interview with the objective of ascertaining how similar the two banks operate. If two or more banks function in a similar fashion, it will give far more foundation and validity to any recommendations that are made towards the end of this project. Already in this project I have used a report into the automation of processes in a bank's loan department as a case study and while it offers a range of possible solutions that should prove valuable, how much it relates to this project is yet to be determined. Generalising from case studies and personal experiences can offer another viewpoint from what might be supposed from the outside. It is this knowledge of both internal and external factors that can supplement research findings to form stronger theories. Past research into the value of generalising from case studies has shown that case studies posses greater structure as they are influenced by a myriad of external factors, such as culture, regulation and current practises which can still apply to situations beyond just the case study in question [22]. The use of case studies over a period of time is also shown to solidify theories if the various sets of results are consistent and these theories can then be deployed in similar circumstances.

This project involves the creation of a number of conceptual models of a 'generic bank', which essentially will be a fictitious organisation. Since the resulting models are highly unlikely to be an exact match for any existing organisation, an issue arises regarding how they will be validated. When an SSM analysis is conducted on an existing system, it can be validated in a number of ways, such as interviews or asking a focus group of appropriate people, as used by W.D. Wilde et al when validating a conceptual model for the outsourcing of IT security [23]. However, in the case of generic models, a different approach is required. This issue was investigated by M. I. Smith et al in their paper 'Verification and Validation Issues in a Generic Model of Electro-Optic Sensor Systems' [24]. They go on to recommend that validation of the models should be undertaken iteratively at numerous stages throughout and with a bottom-up approach. It also advocates the use of external validation, which can include validation done by an outside party, such as an expert in the field or through a comparison with previously validated models that cover a similar situation. For example, if models exist for real world financial institutions, while the whole model may not

be relevant to a generic bank, certain systems or tasks may be fulfilled in the same way if it the easiest or most efficient way for it to be done.

While it has been ascertained that generic models can be validated, can they be trusted when used as a basis for theory or recommendations for change? It is a concept that is examined by Professor Brian Wilson in an as yet unpublished manuscript on generic systems [25]. In this paper, Professor Wilson presents a variety of situations in which generic, non-specific conceptual models are still applicable. One prevalent example is the implementation of an international standard throughout a non-specific organisation, the theory of which can be extrapolated towards the implementation of automation in a 'generic bank'. If the purpose of the system in question is well understood, the resulting root definition, as long as it is thorough and complete, will be of use to the analyst and can develop sound conceptual models. Another of the examples in the paper regards the model of a generic company. This model was originally developed to capture surveying activities across a variety of companies but it can be of equal relevance to a large number of organisations as it includes the basic activities that many businesses will undertake such as satisfying customer requirements and generating profits. Essentially this paper highlights that the use of generic models can be effective as long as the purpose of the system is properly understood beforehand.

SELECTION OF APPROACH

To enable the aims of this project to be realised, a number of approaches were considered. The reasons as to why SSM, for example, was chosen but other methods were discarded is outlined in this section.

Chosen methods:

1. **Soft Systems Methodology**

Since this project involves the creation of a fictitious 'generic bank', SSM was chosen as a suitable method as it allows for the modelling of an ideal system, which can then be compared to the messy complex situations that occur in reality. To capture all of the necessary activities that take place in a banking organisation, an enterprise model approach will be taken as this encapsulates not only the purpose of the business, but also the linking, support and planning, monitoring and controlling activities that occur. A number of existing banks will be researched to derive an overall purpose for the generic bank. This will result in multiple Root Definitions that will then be used to create a CPTM of the generic bank, which can be decomposed into sub-systems to show the enterprise as a whole. In all likelihood, a number of models will be required to fully show each aspect of the organisation. These models will require validation of some kind to show their correctness and this will be achieved through inspection and interviews, to be described in the following section.

Once the enterprise model has been created, each activity can be analysed to determine its viability for some form of automation and the resulting benefits or costs of doing so. This stage will allow justifiable recommendations to be made for future automation of banking processes.

SSM is a suitable tool to use for this project as it allows the standard or ideal activities to be described and compared to the real world processes. Along with the knowledge gained from extensive research on automation principles and related examples, the SSM analysis will allow appropriate recommendations can be made.

2. **Interviews**

Interviewing suitable and knowledgeable people about their opinion of the Root Definitions, Conceptual Models and resulting recommendations is a good way to gain valuable feedback which can be used to validate and improve existing work. As shown by W.D. Wilde et al in their research paper on the derivation of Conceptual Models for outsourcing IT security [23], gaining feedback from appropriate people is a sound form of validation and results in valuable information from a range of perspectives, as long as relevant questions are derived beforehand. This participant validation will also be supplemented through inspection of the

Root Definitions and Conceptual Models by the project supervisor and fellow students throughout the project.

Conducting interviews is a viable option as I have contacts in a number of banks. I have worked in a Lloyds Banking Group branch for approximately 4 years and have gained working relationships with people not only in the branch network, but also in the Credit Cards and Finance departments. This should allow me to interview colleagues in a number of business departments to capture multiple views of the outcomes of this project. A number of former colleagues at Lloyds have recently moved to Santander and I plan to use these contacts to be able to show how my experiences and the Conceptual Models of a generic bank can relate to multiple existing banking organisations.

Other methods considered:

1. **System Dynamics**

System dynamics is used to understand the behaviours of a complex system over a period of time. This approach uses tools such as influence diagrams to achieve this understanding. The main reason that this approach was discarded from this project was that influence diagrams in particular model the various influencing factors that exist in a real world system whereas this project involves the modelling of a fictitious, generic organisation. In reality, the majority of the factors that exist for organisations exist because of the choices the organisation make such as its location and its customer base for example.

SSM was deemed a more valuable approach to model a generic system that can then be compared to reality with the aim of identifying a number of processes suitable for automation.

2. **Business Process Modelling**

In the initial project plan, Business Process Modelling (BPM) was outlined to be undertaken after the analysis of activities from the enterprise model had taken place. However, research showed that BPM is used to analyse current processes with the aim of improvement. It takes the inputs of a process and highlights the outputs while taking into account the necessary constraints in place and resources required. BPM is an effective approach to identifying areas for improvement and even possible areas for automation but in the context of existing systems. Similar to how the system dynamics approach was rejected, BPM will not be as effective as SSM in defining the ideal system as opposed to a present version. BPM may still be used at a reduced level to identify how some processes

work in existing banks, using my own knowledge or that gathered from research, but the results will only supplement the main SSM analysis rather than be a basis for theories.

CONCLUSIONS

The research that has been conducted has identified a number of alterations for the project from what was initially outlined in the Initial Project Plan (Appendix 1). The most significant change is with regards to the interviews with existing bank employees. Originally these interviews were going to be used to supplement the research but it has now been decided that they would be more valuable if used later on to provide feedback on the analysis that has been undertaken and the resulting recommendations for automation. A number of studies have also shown that using knowledgeable participants such as this can also be an effective way of validating generic models which may not be fully comparable a single real world situation.

As highlighted in the weekly project diary (Appendix 3), there were a number of weeks where other commitments meant no work was done on the project and as a result it is slightly behind the stage it was predicted to be at. To counter this delay, changes have been made to the work plan (Appendix 2) to include some activities taking place over the holiday period, which had previously been identified as non-working days. During this additional work, regular interaction will be required with the project supervisor to determine correctness of the root definitions and models, ensuring that they will be of the required quality. Despite currently running slightly behind schedule, the research has shown that if the analysis is undertaken correctly and in sufficient detail, it should allow the project to meet the aims previously outlined.

To date, the research has uncovered a rich variety of background information that will prove valuable as the project progresses. Determining the benefits of automation and the reasons as to why it is often required means that if any of the recommendations are questioned, they can be effectively justified. While SSM was something that I have had practise with in the past, reading around the topic has provided further knowledge to enable greater quality models to be developed and analysis to be done. Based on this analysis, recommendations for automation will be made and the background information that has been uncovered regarding automation principles, solutions and examples will allow for greater clarity and validity of results. It was also brought to my attention that there may be issues around basing recommendations around analysis of generic models. This concept was investigated and it was determined that with a thorough understanding of the purpose of the type of organisation in question, it was still possible to develop valuable models that can be used to suggest improvements. These models can then be validated in a variety of ways, such as

through interviews with existing employees or comparing the models with previously validated models that are similar in nature.

The next steps for this project, outlined in the updated work plan, primarily involve the research into the purpose of existing banks and the development of root definitions and conceptual models around this. This and the subsequent analysis will be included in the final report, to be handed in at a later date. Any further changes or background research that takes place will also be identified in the final report.

Appendix 1: Initial Project Plan and Gantt Chart

CM0343 – Individual Project: Initial Project Plan

Determining the Scope for Future Automation of Banking Processes

Introduction

People play a major role in the operations of banks today. However, they are expensive resources which can show a lack of consistency of service. While two situations may appear similar, there can invariably be different outcomes when humans are involved. This can be caused by a variety of traits, ranging from personality to quality of training received.

Accelerating change describes the increase in speed of development over time, meaning newer technology is released quicker than previous versions. As more systems become computerized, the value placed on a human workforce in banks may diminish over time, therefore reducing the need for the current levels of costly human resources.

By gathering insights from existing bank stakeholders and published missions statements, a purpose for a 'generic bank' can be derived. Using this purpose, the generic bank can be defined and modelled to produce a comprehensive list of activities in which humans currently play a crucial role. These activities will be analysed in turn, to determine whether existing or developing technologies can be used to do the task to the same standards.

Methods

The primary tool used during this project will be Soft Systems Methodology (SSM), which includes the use of rich pictures and creation of a root definition, conceptual model and enterprise model, which can then be compared with reality. This comparison could include

an interview with an existing bank employee, which would also provide a valuable insight into how staff would perceive these changes. The enterprise model will be developed for the generic bank as a whole, showing the various departments and their tasks. This will be used to analyse specific tasks with the view of concluding whether or not they could be computerised. A large part of the background research stage of the project will be studying Brian Wilson's SSM principles as well as study into the background of the problem itself.

One of the main challenges of this project will be validating the model for the generic bank and seeing how it can relate to the real world.

There are currently occasions where customers have to deal with human employees at banks, such as opening accounts in branch and making a complaint. As part of the recommendations of the project, a number of processes will be selected and described using process modelling highlight where changes could be made.

Aims and Objectives

The overall objective of the project will be to determine the scope for future automation of banking processes using the methods described above. Once this is defined, recommendations will be made for further action with evaluations of their perceived effectiveness. Examples of benefits that may be seen could be cost savings, greater efficiency, reduced waste and increased consistency.

As part of the recommendations and evaluation, a number of key questions can be answered relating to the increased use of computers in the banking industry, such as;

- Will computerising more systems save banks money?
- How will existing services and products be affected?
- Will these process changes increase consistency of service?
- How will customers react to the changes?

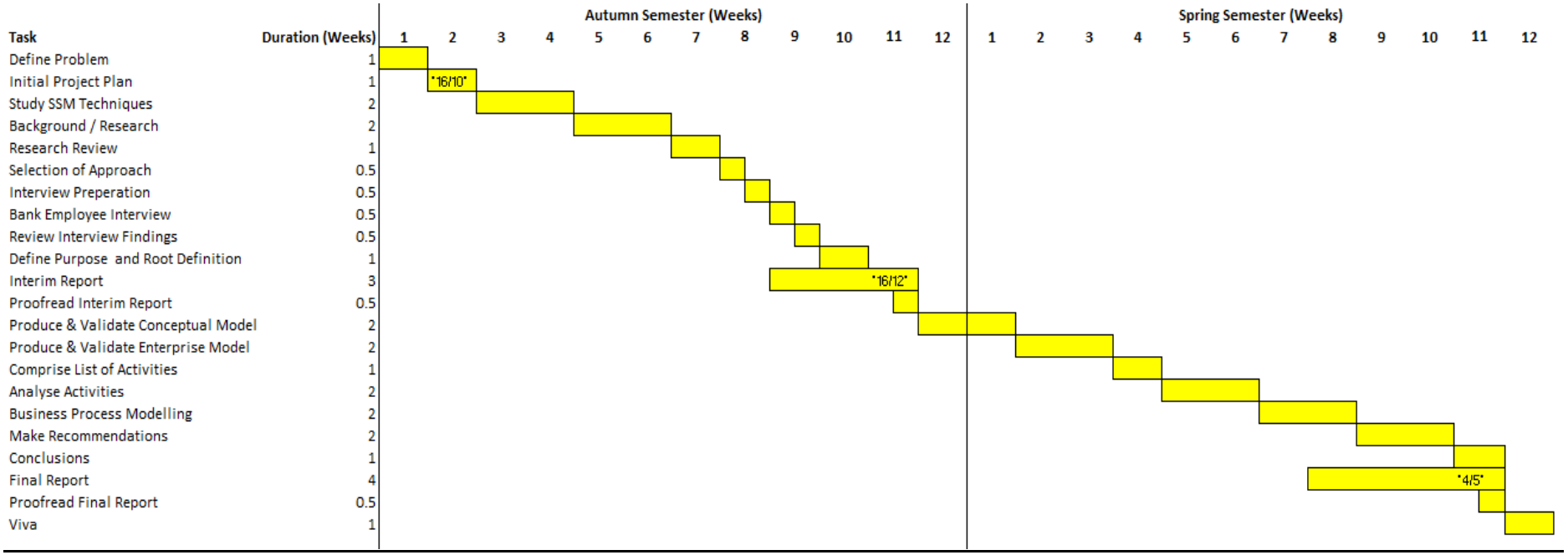
The two reports that will be produced during this project will offer an interim and final view of the progress of the project and its conclusions. The interim report, to be completed by 16/12/11, will primarily look at the current progress of the project and review the background research that was undertaken. At this point, the project is estimated to be at the SSM stage and an ongoing assessment of its progress will also be included. If any of the requirements or objectives of the project has changed during the first stage, these will also be explained here. This report will be written concurrently with various stages of the project.

The final report, which has a deadline of 4/5/12, will include the remainder of the SSM work, a completed enterprise model and process models, along with the analysis and

relevant conclusions. This final report will aim to answer the overall question posed by the project, by taking all work into account and providing a balanced view of the theory. As with the Interim report, the final report will be produced alongside the remaining stages at this point.

WORK PLAN

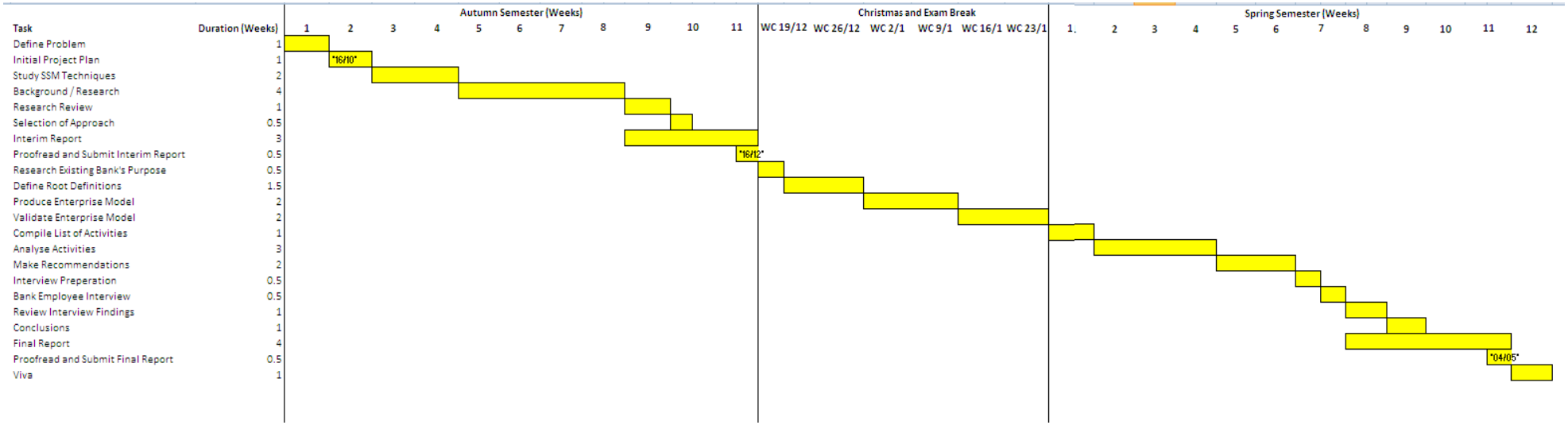
The following Gantt chart highlights the deadlines throughout the project, designated by *, as well as the expected progress. The exam break between semesters has been defined as non-working days.



Appendix 2: Updated Gantt Chart

WORK PLAN

The following Gantt chart highlights the deadlines throughout the project, designated by *, as well as the expected progress. Changes in the schedule from the original work plan, such as work to complete during the break between semesters, has been included in this update. The interim report was initially started in week 9, while other tasks were still ongoing and a similar situation will occur when the final report is written in the spring semester.



Appendix 3: Project Diary

WC = Week Commencing

Autumn Semester

Week 1 (WC 03/10/11) – I gained approval from my supervisor regarding the project topic and began to draft initial project plan.

Week 2 (WC 10/10/11) – Showed the first draft of the initial project plan to both the project supervisor and moderator to get feedback on any required changes. Once the changes were included, the completed initial project plan was uploaded onto PATS for final approval.

Week 3 (WC 17/10/11) – Began my research into the related topics by finding a number of relevant articles, journals, websites and books as well as purchasing Brian Wilson's book on SSM to be used as a reference and a guide throughout the project.

Week 4 (WC 24/10/11) – I continued research into related areas, focussing primarily on process automation and previous examples of automation in the global banking industry.

Week 5 (WC 31/10/11) – Focus of the research shifted to the academic questions posed by the project such as validation of models and value of generic models. I also met with my project supervisor to discuss research progress.

Week 6 (WC 07/11/11) – No project work carried out due to coursework commitments.

Week 7 (WC 14/11/11) – No project work carried out due to coursework commitments.

Week 8 (WC 21/11/11) – No project work carried out due to coursework commitments.

Week 9 (WC 28/11/11) – Results of previous research collated together and the basic structure of Interim Report was set.

Week 10 (WC 05/12/11) – I attended the project lecture regarding the Interim Report and amended my structure accordingly to include the relevant details. I also began to write the report with first draft of the introduction and literature review completed.

Week 11 (WC 12/12/11) – Met with project supervisor to discuss the structure and content of the Interim report and he suggested some minor alterations. Wrote up the remaining sections of the report and proofread before online submission to PATS.

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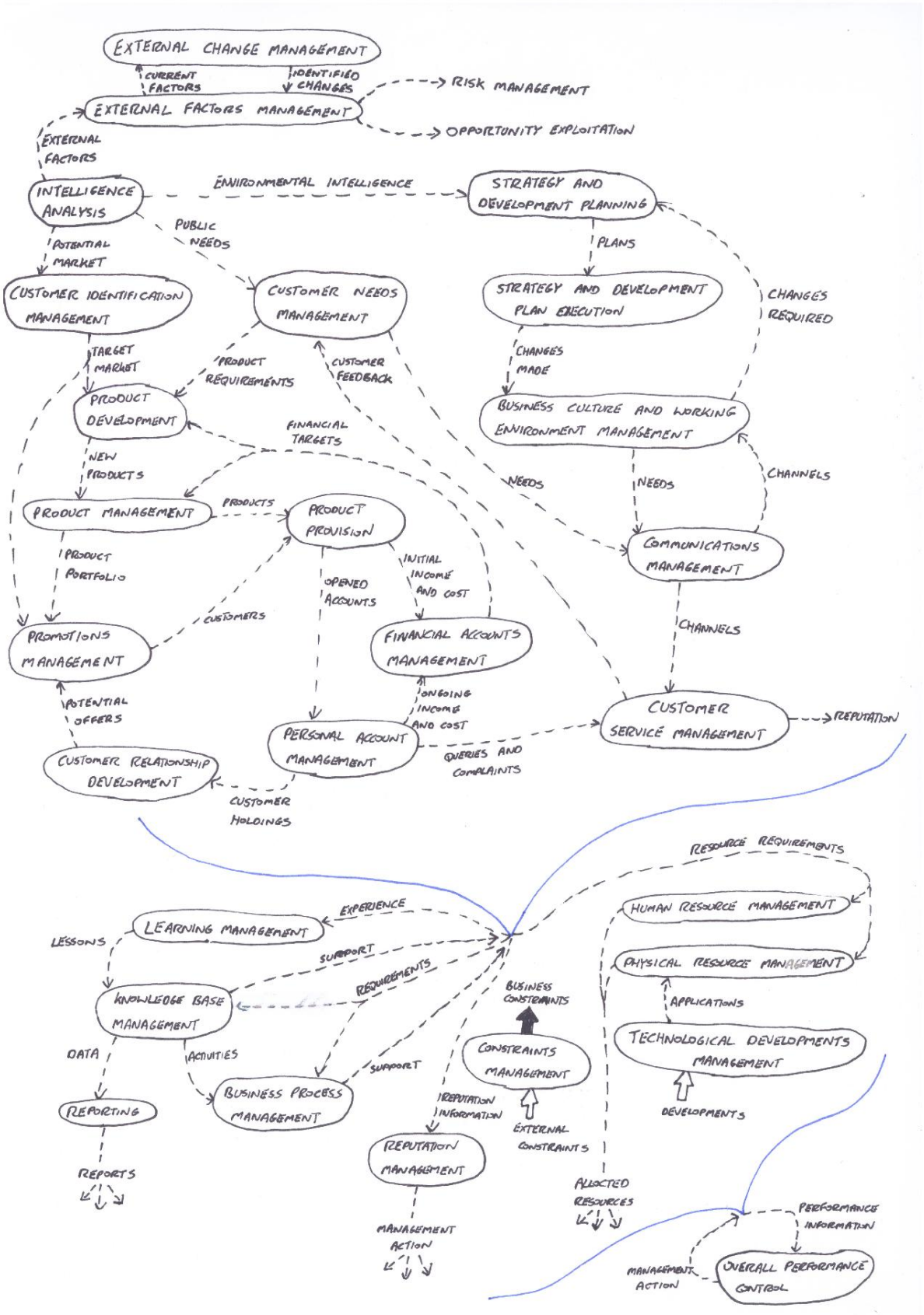
Appendix B - Subsystem Diagram



Appendix C - Student Validation by Sowdagar Badesha

The enterprise-wide approach utilised alongside the Consensus Primary Task Model (CPTM) are both appropriate modelling methods for capturing the activities associated within the operations of a generic bank as they support system-wide modelling, giving you the opportunity to model the entire organisation. Such an approach potentially empowers you with the ability to see the organisation in the bigger picture and how each organisational subsystem interacts with each other and its environment with the aim of fulfilling a vision.

Firstly, it involves constructing a series of Root Definitions which are rich paragraphs containing a system purpose and act as a means for justifying a set of activities that enable the system purpose to be fulfilled under given constrains. The Root Definitions here are formulated with care, based on extensive background knowledge from personal experience, thorough research and reliable sources within the banking industry. These Root Definitions are categorised by T (transformation process), S (support), L (Linking) and lastly PMC (Planning Monitoring and Control). The approach used in this instance utilises all these types of activities with a comprehensive array of Root Definitions for each category, thus ensuring maximum detail for the Enterprise Model. Activities associated with the T Root Definition are concerned with achieving a generic bank's core purpose; which in this case is in 'meeting the dynamic financial needs of the public whilst seeking to operate while covering costs of operations and ensuring sustainable growth'. The S Root Definitions provide activity information and direct support to those activities associated with the core purpose. The L Root Definitions then cover activities relating to the bank's relationship with its environment, from gaining new customers to aligning the company's business practices to meet demands imposed by ever-changing government legislation. Lastly PMC activities are directly incorporated within all subsystems within the organisation, enabling each to remain relevant and compliant through constant monitoring, modification and re-aligning of activities and processes to work towards a future vision generated by the organisation, influenced by external factors contributed by activities associated with L systems.

To represent the activities associated with the Root Definitions, the CPTM approach has been employed. Using the Enterprise Model approach in conjunction with this allows you to ensure that all the necessary subsystems are represented within the CPTM, thus resulting in a richer depiction. This allows you not only to see how each subsystem contributes to the foremost goal as expressed in the T Root Definition, but also dependencies within these activities as well as subsystem boundaries and potential departmental crossover of activities.

The approach taken during initial activity analysis for the CPTM is to list a series of potential subsystems for each activity, and then state which activity belongs to which subsystem whilst concurrently indicating whether the activity supports the T, L, S or PMC functions within the enterprise approach. This is a good decision, as it allows you to view how each

subsystem within the bank fits into dimensions in the Enterprise Model approach. For example the subsystem “Intelligence Analysis” is may comprise of 3 transformational activities as well as an activity relating to the L3 root definition. From this, it is then possible to define what information is required for each activity to model dependencies and represent a basis for further analysis that could help you plan for and justify change.

One of the slightly more elusive and harder to represent set of activities is the PMC activities. Arguably these actions are present in all functions, but it is still necessary to recognise them officially so you can effectively define the goals for these activities, review current understanding and incorporate change based on new information. Without properly defining PMC, there is a higher risk of assuming the organisation is operating correctly as there will be insufficient monitoring activities to spot potential issues before they can have a negative organisational impact.

Overall this application of SSM, specifically the Enterprise Model and CPTM approach has followed guidelines consistently and enables the analyst to build an argument for incorporating change that is justifiable because it is has considered how all dimensions that comprise a banking system contribute to its core purpose, ultimately meeting the needs of all stakeholders. Also the analyst is able to capture the relationships and exchanges of information between functions at both a high and low level enabling them to truly model change.

Appendix D - Interview Responses

Interviewee: Catrin Roberts (CR) Interviewer: Rhys Carpenter

Company: Lloyds Banking Group

Position: Reporting Finance Manager

Do the Root Definitions fully cover the purpose of a bank in your opinion?

CR: Yes

Does the model accurately represent the systems present in your bank? If not, why?

CR: On the whole the model seems mostly complete. I think there may be a case for a credit risk system that would be separate from the external factors risk management. This is because it would deal with individual customer applications and is a major factor in determining the amount of accounts the company holds. Also, there seems to be an IT support system missing from the model which is essential to ensure business continuity.

Do the sample activities fully represent how the tasks are undertaken? How do you decide how to do a task?

CR: Generally yes. I see the inclusion of transaction and settlement activities but you may also want to include collections and recoveries as separate to those. As I work in a finance department, the way a task is undertaken is often determined by relevant regulation. As well as that, stakeholder consideration is also sought in a bid to identify the best way to achieve the goals of the task.

Are you satisfied with current levels of automation at your bank?

CR: To some extent. We are in the process of implementing a new reporting tool that will generate reports on request. The result of this will mean less focus is required for report building, which often takes considerable time, and more on the output and content of the report.

How would you decide what processes to automate? (E.g. identify decision rules, programmable actions?)

CR: We have a retail team who would identify certain activities as candidates for automation or general process improvement. Some things they tend to look out for would be tasks involving large amounts of data or repetitive tasks where automation would make it much more manageable.

Once the decision to automate has been made, how would it be achieved?

CR: We have a project team located centrally who would coordinate the process of automating but employees would also be a large part of it. The people who will end up using the system will also contribute to the building of the system as this will hopefully deliver a better system. The automated system would then be tested on a small scale in parallel with the existing system before using it more widely.

In your opinion, are there any activities or subsystems in the model that could benefit from automation?

CR: Much of the reporting and decisions around account applications are already semi-automated. The areas that would see the most benefit from automation would be finance, operations and customer service.

Are there any additional processes not included in the model that you believe could be automated?

CR: We currently have a system where BACS and CHAPS payments from HBOS (Halifax Bank of Scotland) accounts over a certain amount threshold have to be manually signed off by an authorised person. This process is allocated to people on a rotation basis as it can take up to 4 hours out of a working day. Automating this process would allow huge amounts of time to be saved and spent on more productive tasks. However, the system to deal with payments from Lloyds TSB's accounts is already automated but suffers from far more errors such as duplicate or incorrect payments.

Interviewee: Margaret Chapron (MC) Interviewer: Rhys Carpenter

Company: Principality

Position: Senior Mortgage Underwriter

Do the definitions fully cover the purpose of a bank in your opinion?

MC: Yes

Does the model accurately represent the systems present in your bank? If not, why?

MC: As Principality is a building society we do not provide current accounts or credit cards but we would still have a department to look after other personal accounts such as savings and mortgages. We definitely have aspects of all these systems in Principality. One thing that may be missing from the model would be an information security management system. This is definitely a big aspect of all financial organisations.

Do the sample activities fully represent how the tasks are undertaken?

MC: They are very generic and high level and what the business does will obviously go into much greater detail.

Are you satisfied with current levels of automation at your bank?

MC: They are certainly better than they were before. When I started here 10 years ago, I had recently moved from Abbey National and the difference was shocking. Although I guess it should have been expected as Principality is relatively small and well behind the bigger players in the market. We are currently using one underwriting system that is not totally fit for purpose after the recent financial crisis but we have to use it because the company initially made a huge investment in its development.

How would you decide what processes to automate? (E.g. identify decision rules, programmable actions?)

MC: The processes that generally get automated are those that are repetitive or involve large volumes as these are the ones which will see the most benefits. There is no point automating an extremely complex system that is not used often as it is because the costs

cannot be justified. New regulation often dictates what processes we automate as the requirements for systems can change.

Once the decision to automate has been made, how would it be achieved?

MC: If a system is broken or is recognised as not being efficient, a change request is put into our IT department, which are housed in the same building as us. The IT department would then develop the system in-house using dedicated project teams and testers who work in sprints. The resulting prototypes are then put into situational and user testing to determine the effectiveness.

In your opinion, are there any activities or subsystems in the model that could benefit from automation?

MC: We are currently in the process of developing our personal account management online system, although this is something that most other banks have had in place for a long time. There are aspects of financial reporting and learning management that can be automated but the benefits of doing so must be identified first. The task of underwriting uses programmed decisions and decision rules, such as age, location, income stretch etc, to first identify the risk score of an application before it is fully underwritten. These rules can often be loosened or tightened depending on the amount of accounts the company wants to deal with at that time.

Are there any additional processes not included in the model that you believe could be automated?

MC: In Principality, our further lending on mortgages is still a manual process involving paper applications and manual credit scores. I don’t know of any plans to automate this yet but it is something that should definitely happen in the near future.

Interviewee: Mike Kynan (MK) Interviewer: Rhys Carpenter

Company: Lloyds Banking Group

Position: Settlements Manager

Do the definitions fully cover the purpose of a bank in your opinion?

MK: Yes, I would say so.

Does the model accurately represent the systems present in your bank? If not, why?

MK: I would argue that Operational Finance plays a huge role in banks and deals with the day to day financial aspects the business such as Direct Debits, missed payments, project costs etc. This system would receive inputs from throughout the business and would sit underneath the pure finance system, providing the overall financial data required.

Do the sample activities fully represent how the tasks are undertaken? How do you decide how to do a task?

MK: In our case, the department leader would look at a task and determine which team it is best suited to and allocate as such. The selected team would then be responsible themselves for completion of the task. In finance and reporting, the same reports are required on a monthly basis, so there will always be an opportunity to review past performance and seek areas for improvement.

Are you satisfied with current levels of automation at your bank?

MK: In my opinion, there is too much automation, but I come from an old way of thinking. If a particular system is automated to the maximum with macros and code etc and something goes wrong, what would happen if the people with the original knowledge had left the business? Or if staff levels had been reduced due to automation but there was no-one available to fix the problem? This is when we would see huge problems.

How would you decide what processes to automate? (E.g. identify decision rules, programmable actions?)

MK: We use a Process Improvement Document. Weekly team manager meetings are held to review any process improvements. If anything, this is done to instil a culture of working in a change environment and being able to adapt to the change and embrace new technologies. One important fact is however that to automate something, you need the required skill set and relevant thought process. Without those, automation is not going to go well.

Once the decision to automate has been made, how would it be achieved?

MK: We are not lucky enough to have an IT team on hand to develop a new system for us so it is all done by individuals within the department. Most of the process improvements we identify are quite small and therefore easily achieved.

In your opinion, are there any activities or subsystems in the model that could benefit from automation?

MK: Nothing really jumps out at me at the moment. Most of the obvious things to automate have already been done in a company the size of LBG.

Are there any additional processes not included in the model that you believe could be automated?

MK: The Faster Payment disbursement process could benefit from automatic capture of the customer's sort code and account number. The current system of Faster Payments, and also Cheque payments, in the settlements team is semi-automated to the point that we can efficiently do 1000 settlement payments per day, but it still requires some manual input. We could also have a better automated reconciliation tool. The one we have at the moment is web-based and automated but does not have the front-end GUI that something like Excel can offer. You can think of it as like Excel but without the bells and whistles.

Interviewee: Hannah Greenway (HG) Interviewer: Rhys Carpenter

Company: Lloyds Banking Group (Halifax branch)

Position: Banking Advisor

Do the definitions fully cover the purpose of a bank in your opinion?

HG: Yes, as long as the customer service description also includes activities such as power of attorney and bereavements.

Does the model accurately represent the systems present in your bank? If not, why?

HG: Yes, I can't think of anything additional that should be included

Do the sample activities fully represent how the tasks are undertaken? How do you decide how to do a task?

HG: As a Banking Advisor, much of what we do is governed by FSA regulations. Regulations are in place to guide us on how to process account applications, do credit checks, deal with complaints etc.

Are you satisfied with current levels of automation at your bank?

HG: After the recent merger of HBOS and Lloyds, we have had a new system implemented that seems much more automated and collaborative than before. The previous system we dealt with used multiple programs at once which were often confusing. However, there does seem to be more paperwork now, so that can always be improved. The down side is that automating a few more processes in branches may mean jobs such as mine as no longer needed.

How would you decide what processes to automate? (E.g. identify decision rules, programmable actions?)

HG: We have a system called 'Colleague Connect' which encourages colleagues to provide their own suggestions on how systems and processes can be improved. The suggestions are then open to all colleagues to 'Like', much like on Facebook, and the theory is that the suggestions with the most 'likes' will get more support from management.

Once the decision to automate has been made, how would it be achieved?

HG: I honestly do not know. It is not something I have any experience of whatsoever.

In your opinion, are there any activities or subsystems in the model that could benefit from automation?

HG: Product Provision is already semi-automated through the online banking service. Almost anything that a customer can do in branch is also available to do online. As I said before, automating much more of the branch processes will mean many jobs are no longer required. I presume an activity like intelligence gathering can be partially automated with a system to collect as much related data as possible on a continual basis.

Are there any additional processes not included in the model that you believe could be automated?

HG: The current process of getting customers to sign an application form is a complete waste of paper and can be improved. At the moment, we have to print a document which the customer then signs before it is scanned back onto the system.

Interviewee: Neil Jenkins (NJ) (Interviewer: Rhys Carpenter)

Company: Lloyds Banking Group (Halifax Branch)

Position: Customer Manager

Do the definitions fully cover the purpose of a bank in your opinion?

NJ: I would argue that the core purpose of a bank is to make a profit rather than 'at least cover the costs of operations'. We have a Board of Directors that get paid millions each year to try and ensure this happens and it is a requirement of banks in the current climate.

Does the model accurately represent the systems present in your bank? If not, why?

NJ: Yes, although you could possibly have a legal function which is separate to the Constraints Management system to determine whether current operations are legitimate. This is a big part of how banks operate as the smallest breach of legislation can have big consequences, both financially and on the reputation of the bank.

Do the sample activities fully represent how the tasks are undertaken? How do you decide how to do a task?

NJ: Yes. Almost all processes have a company-prescribed procedure, with managers given some discretion. In branches, the suggested approach to pretty much every task we would do is described on a system called 'Retail Procedures'. I wouldn't know how they decide how to do a task before writing that. I would guess it would involve some trial and error but be largely based on how the bank's systems work.

Are you satisfied with current levels of automation at your bank?

NJ: Not at all, there is so much that can be automated. Since we have migrated Halifax branches to the Lloyds TSB system, a lot of processes are manual, such as tax registrations, ISA re-designation etc.

How would you decide what processes to automate? (E.g. identify decision rules, programmable actions?)

NJ: You would have to apply certain rules to it first, such as would it improve customer service or would it impact the ability of branches to sell? The cost of a suggested automation system would also need to be justified in terms of the benefits it would bring.

Once the decision to automate has been made, how would it be achieved?

NJ: I think we have an in-house IT team to deal with system development. Any new system would be tested first, before being piloted in a small number of branches to gather feedback. Any additional changes would then be made before the system could be rolled out nationally.

In your opinion, are there any activities or subsystems in the model that could benefit from automation?

NJ: A number of the systems are already automated in some banks now. For example, I believe that intelligence gathering is completely automated and a large amount of promotions is also automated, such as sending marketing material by post, email or text. However, we still find that promotions done by humans, i.e. outbound calling, is far more successful than postal marketing. A lot of the other systems will always need some sort of manual input or management.

Are there any additional processes not included in the model that you believe could be automated?

NJ: We are currently piloting a digital marketing system in branches where TV screens are placed around the branches and the displayed content is determined by a number of factors like footfall, regional information of time of the year. A lot of our time is also spent speaking to an underwriting team to appeal declined account applications. This process can definitely be sped up but be aware that the law states that underwriting needs a 'right of appeal' therefore some manual input may always be required.

Interviewee: Paolo Tamburello (PT) (Interviewer: Rhys Carpenter)

Company: Santander

Position: Banking Advisor

Do the definitions fully cover the purpose of a bank in your opinion?

PT: Yes I believe so. A bank is a huge organisation involved in many areas but the definitions seem to cover the primary focus of the majority of banks. If anything, there could maybe be more focus on the sales side of the business. In branches, the focus is geared towards the selling of products as well as offering good service to customers.

Does the model accurately represent the systems present in your bank? If not, why?

PT: Most of it seems quite accurate to me. I'm not sure how a company would monitor and deal with its reputation but the systems of analysing the markets, creating products and offering to customers seem sensible.

Do the sample activities fully represent how the tasks are undertaken? How do you decide how to do a task?

PT: My role is based around product provision and customer service. The branches and company as a whole do actively market the products to customers and try to ensure that every customer can be seen when they want. We don't provide detailed feedback as to why an account cannot be opened. For example if a customer fails a credit score, we usually tell them to check their credit file online for reasons as to why the application declined.

You have worked for both Halifax and Santander. Are there any major differences between their processes or how they operate as a whole?

PT: There isn't a great deal of difference between the banks. Although some processes differ slightly. For example, both banks have account switcher services although with Santander the customer has to move all direct debits and credits themselves where Halifax have a dedicated switching team. I think Santander have a better ISA (Individual Savings Account) system as they allow customers to add in next year's tax free allowance into a fixed ISA within a 14 day window, meaning customers can open a single ISA for 2 year's allowances. Other than these small differences, the services on offer are much the same. All banking

advisors now need the relevant qualifications so the regulations in place tend to make all banks quite similar in my opinion.

Are you satisfied with current levels of automation at your bank?

PT: Yes

How would you decide what processes to automate? (E.g. identify decision rules, programmable actions?)

PT: It's not an area I have any experience in so I wouldn't be able to give you an answer.

Once the decision to automate has been made, how would it be achieved?

PT: I presume they would develop a prototype system that would automate the process, test it internally on a small scale initially before rolling it out in a few pilot locations only to see it in a working environment. This will allow the small glitches to be ironed out before the system can be rolled out nationally.

In your opinion, are there any systems that you currently deal with that could benefit from automation?

PT: I would like to see a system to reduce the levels of paperwork that a branch currently holds. Aside from storage space, a lot of my day is currently spent sorting out paperwork from customer applications. I would like to see a system where the customer can electronically sign a document, which is then stored in a database at head office. If needed in the future it can be easily retrieved as opposed to searching through thousands of past applications for one piece of paper.

Are there any processes or systems that are not included in the model or implemented in your bank that would like to see:

PT: I would like the account switching service to be more flexible, such as being able to pick certain direct debits to switch and to move joint bank accounts from elsewhere to a single account at Santander and vice versa. A system to move direct debits from one account to another internally would also be ideal and save both the bank and customer a lot of time and effort.

Appendix E – Final Root Definitions

T - A system to meet the dynamic financial needs of the public and seeking to at least cover the costs of operations by undertaking the required processes to ensure the timely provision and operation of a range of appropriate financial services products via multiple accessible channels while operating to the required industry standards, relevant banking legislation and within the constraints imposed by the economic environment.

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L1 – A system to maintain the desired customer base in each product area by exploiting appropriate information to identify and attract potential new customers while also developing and maintaining existing customer relationships through excellent service and personalised offers to ensure satisfaction, while complying with relevant legislation.

L2 – A system to maintain desired levels of distribution and adoption of the financial services products offered by the business by increasing product awareness through the undertaking of the necessary processes to publicise the features and availability of the products to customers based on their current financial needs, in such a way as to lead to the realisation of the maximisation of benefits to the business, while operating within promotional regulations.

L3 – A system to identify and respond to risks and opportunities to the business from the external environment by periodically gathering and assessing comprehensive intelligence on the financial industry, customer activity and requirements and competitor operations to assist the decision-making activities of the business and ensuring the information is made available to the necessary business functions in an appropriate manner.

L4 – A system to identify and, where appropriate, incorporate new and amended government legislation and other relevant external factors appropriately into the business in order to remain compliant by amending relevant business processes to accommodate the changes while still ensuring the business operates as desired.

L5 – A system to ensure the organisation's reputation is maintained by undertaking a range of support functions that underpin the core activities of the business in such a way that ensures the business provides a consistent and quality service to stakeholders, while operating to company policy and relevant legislation.

L6 – A system to meet the basic needs of the bank's customers by undertaking the necessary processes to complete valid transactions on, and between, accounts, including settlements, and to respond to queries and complaints in a timely and satisfactory manner, while operating within FSA legislation relating to transactions and complaints.

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S1 – A system to ensure that the available physical resources match the requirements of all activities and meet required quality standards, while ensuring the continual development of these resources to improve the overall performance of the generic bank's various functions and maintain its competitiveness by exploiting relevant technological developments and adhering to the relevant standards and constraints.

S2 – A system to ensure the human resource capabilities available to the business match the requirements of all activities through the acquisition, disposal and development of personnel, as appropriate, to ensure the current roles are fulfilled effectively and allow individuals to realise their potential while seeking to balance both personal and business needs and operating within relevant policies and employment constraints imposed by the business and the environment.

S3 – A system to ensure the availability and capability of communication resources, geographically spread across the business, match the requirements for all activities so that the required information can be sent securely and timely through available channels to achieve its purpose to the satisfaction of all parties involved.

S4 – A system, operated by suitably skilled staff, to develop and maintain an up-to-date knowledge base to support all activities undertaken by the business by acquiring, processing and making information available, as appropriate, as needed for business processes, including information gained from learning activities, while operating within regulatory information constraints and defined security policy.

S5 – A system to develop and maintain a culture and working environment which allows the various business departments to work coherently towards the vision of the shareholders and board by ensuring that the organisation's values and objectives are well publicised and facilitates the creation and provision of financial services products to satisfy the perceived needs of the public.

S6 – A system to ensure the security of the organisation's information assets by identifying and implementing appropriate security controls in such a way as to develop a culture of security throughout the business to ensure the key concepts of information security are upheld while recognising the constraints arising from security and relevant information legislation.

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PMC – A shareholder owned system, operated by the Board of Directors, to realise the strategic goals of the business and progress towards a defined vision within the dynamic external environment by developing and executing suitable plans, supported by appropriate policies, and maintaining appropriate internal controls in such a way as to achieve the desired changes and benefits within the planning timescale while operating to financial targets, company policy, financial industry regulations and other relevant legislation.

Appendix F - Final Enterprise Model

The list of subsystems included in the final Enterprise Model, shown on the following page, was as follows:

1) Intelligence Analysis
2) Strategy and Development Planning
3) Strategy and Development Plan Execution
4) External Factors Management
5) External Change Management
6) Business Culture and Working Environment Management
7) Customer Identification Management
8) Customer Needs Management
9) Product Development
10) Product Management
11) Promotions Management
12) Product Provision
13) Personal Account Management
14) Customer Relationship Development
15) Financial Accounts Management
16) Customer Service Management
17) Human Resource Management
18) Physical Resource Management
19) Communications Management
20) Technological Development Management
21) Learning Management
22) Knowledge Base Management
23) Business Process Management
24) Reputation Management
25) Reporting
26) Information System Security Management
27) Constraints Management
28) Overall Performance Control

(Please see attached Enterprise Model in PDF format)

Appendix G – Activity Analysis Table

(SS = Subsystem. See Appendix E for numbered list of subsystems)

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
1	1	Define the public	-	2	Activity not explicitly undertaken. 'Public' is taken as the population within which the business operates.	No.	No.	N/A
1	2	Decide how to assess the public's financial needs	1	3	Management and operation team likely determine procedure of assessing needs.	There may be some aspects of PD but determining the overall assessment method would require human deliberation.	The overall needs of the public are unlikely to change often from a range of products and services. Therefore this activity will not be undertaken often.	Attempting to automate this activity will not be beneficial as it does not occur often.
1	3	Assess the public's financial needs	2	4, 96	Gather intelligence on the financial state of the public and determine needs based on this such as insurance services, deposit accounts etc.	To some extent. For example, if the total public debt increases, the need for consolidation borrowing may also increase.	The activity can be partially automated but as the output will drive the direction of the organisation, some manual checking would be desirable.	Automating this activity can result in an incorrect focus for the business if poor analysis is undertaken. Consequences of this would be severe.
1	4	Determine how to identify dynamic effects on these financial needs	3, 40	5	Analysts will periodically assess intelligence for signs of change and related factors or incidents.	Some PD will be involved. Analysis tools can be implemented to identify trends	Yes. An algorithm could be defined to identify trends between changes in needs and other factors.	An automated system could quickly identify possible shifts in public needs and allow the organisation to act appropriately.
1	5	Determine what intelligence is necessary to the organisation	4	6, 7, 8, 9	Management decision to determine the focus of required intelligence	No.	The required intelligence will not change often, therefore automation is not necessary. More focus is given to keeping	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
							intelligence relevant and up-to-date.	
1	6	Define periodically with respect to the gathering and assessing of market intelligence	5	10	Manual decision to affect the rate at which intelligence is gathered and assessed. Existing automated systems will continuously gather data from the environment.	No.	No.	N/A
1	7	Define comprehensive with respect to levels and content of intelligence required	5	10	Management or the data warehouse owner will determine the requirements of the intelligence.	No. Alterations will be made based on feedback or poor intelligence results. Likely to be a management decision.	No.	N/A
1	8	Decide how to gather intelligence on the financial industry, customer activity and requirements and competitor operations	5, 41, 42, 43	10	Manual process of determining sources of data and gathering techniques.	No. Once determined the intelligence gathering method will only be changed following feedback or poor intelligence results	No.	N/A
1	9	Decide how to assess gathered intelligence	5	13	Manual process of determining intelligence assessment technique.	No. Once the assessment method is chosen, alterations will be rare.	No.	N/A
1	10	Gather appropriate intelligence on a periodic basis	6, 7, 8	11, 13	Interviews with bank employees showed that Lloyds Banking Group employ automated systems to gather market intelligence. Automated systems are in continuous operation to gather relevant data from the environment.	Some PD involved. It will be possible to develop algorithms to gather data either continuously or on a periodic basis from the environment. Systems currently exist that will gather intelligence from sources on the web. This could	Many automated systems already exist that continuously gather intelligence from the environment [32].	Wide scope and level of intelligence possible with automated system compared to manual intelligence gathering. Initial cost of system will be offset by improvements in knowledge and greater ability to satisfy

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					Some manual input will be required for bespoke data queries. Manual systems will make use of marketing teams to gather pre-defined information.	be amended to also gather data from internal systems.		stakeholders.
1	11	Monitor the appropriateness of gathered market intelligence	10	12	Automated systems can identify errors in collected data. Appropriateness will usually be analysed following an incident involving poor intelligence.	Automated systems will have algorithms built in to identify any bad data. No PD involved in monitoring whether 'correct' data is appropriate.	No.	N/A
1	12	Take control action to ensure intelligence is appropriate	11	-	Management action required to identify the error in intelligence and identify any necessary corrections.	No.	No.	N/A
1	13	Assess the gathered intelligence	9, 10	33, 53, 104	The Bank of England employ a dedicated market intelligence team to analyse collected data [33], while JP Morgan created a computerized tool for inquiries and reporting [34].	Yes. Data Analysis tools, such as Business Intelligence, currently exist that use statistical analysis algorithms to consider large amounts of data with the view of producing reports based on the results [35].	Yes. Combining computerized systems that allow data queries and reporting with statistical analysis algorithms will allow for automated intelligence assessments. An example of an automated market intelligence analysis tool is by Quant Interpretations [36].	The initial cost of developing a system to meet the needs of the specific organisation may be large but the example from Quant Interpretations show that customer profiles can be created within seconds rather than wait for manual research to be undertaken.
2	14	Define the vision of the	-	15, 17,	The Board are entrusted	No. The vision is a	No. The rarity and	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		shareholders and the Board		18, 29, 76	with running the organisation and develop a vision based on the best interests of the business.	statement of the desired direction of the business and is meant to have long-term relevance.	importance of this activity means that the current Board should develop the vision in accordance with the best interests of the business.	
2	15	Decide how to identify strategic goals	14	16	Since the strategic goals of the business will be identified by upper management, the process of identifying them will be determined by the same individuals.	No. The resulting strategic goals should have long-term relevance and as such the activity should not be undertaken often.	No.	N/A
2	16	Identify strategic goals	15, 17	19	The Board or relevant senior management many utilise automated tools, such as market intelligence, to aid with the process of identifying goals but the task itself will involve human interaction.	No.	No.	N/A
2	17	Determine areas to focus development and strategic plans	14, 18	16, 21	Prior to the identification of strategic goals, the board will identify the most significant areas on which to focus the development of the business.	No.	No.	N/A
2	18	Identify the desired changes and benefits to achieve by following the strategic plans	14	17, 27, 29	By using the vision of the organisation, the Board or senior management will identify the desired	No. The activity will involve management discussion and is not routine or regular.	No. The desired changes may be reviewed periodically but not often enough to warrant	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					changes during strategic meetings. Input may also be gathered from shareholders.		system automation. The process is also of significant importance that Board discussion is desired.	
2	19	Identify suitable timescales for the strategic goals	16	21	The individuals responsible for operating the company will determine suitable timescales for the goals set via ongoing discussions. These timescales may be reviewable over time.	No.	No.	N/A
2	20	Decide how appropriate policies can support plans	350	21	The company policies of operation and possibly ethics may influence the resulting strategic plans. The importance of the strategic plans will mean that the Board will have significant input into this decision.	No.	No.	N/A
2	21	Develop suitable strategic and development plans	17, 19, 20, 22	23, 25	The Board, with possible input from shareholders, will analyse all available data to determine appropriate plans that are in the best interest of the organisation.	No. Resulting plans will have long-term relevance meaning that the activity will not be regular occurrence.	Automated systems exist that develop strategies for stock trading [37] but the importance of developing strategies for an entire organisation would mean that the shareholders would not consider allowing this process to be automated.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
2	22	Determine appropriate internal controls to enable the business to operate as required	-	21, 26	Upper management will determine the necessary controls to have in place to allow the business to operate with a view to achieve the strategic goals.	No. Once the plans are derived, they will require analysis to determine appropriate controls. New or amended plans will not occur regularly and therefore this activity will also be rare.	No.	N/A
2	23	Monitor the suitability of developed plans and strategy	21	24	Upper management will regularly meet to review organisational performance with a view of determining the suitability of past plans.	Algorithms could be used to monitor the performance of the organisation and compare with the achievement of defined goals.	An automated monitoring system could be employed to assess the progression towards the strategic goals using quantitative data. However the importance of an organisational strategy may mean that regular management reviews are more suitable.	In relation to strategic plans of an organisation, any unsuitable area of a plan not identified by the automated system could have a significant effect on the business.
2	24	Take control action to ensure the suitability of plans and policies	23	-	Unsuitable plans will be reviewed by the Board to make the appropriate amendments.	No. This activity will be similar to the development of new plans and therefore will only be undertaken when needed.	No. The importance of analysing where existing plans were unsuitable and altering as required is of great importance to the success of the organisation and will be undertaken by the Board.	N/A
3	25	Execute suitable plans	21	26, 27	Once derived, the plans will be manually circulated to the appropriate team leaders advising them of	The execution of plans may involve a series of activities than could be seen as PD. However, since the strategic plans	Any necessary actions derived from strategic plans are likely to involve alterations to the way an entire team or	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					any required actions	have influence on the whole organisation rather than a single system, any required actions are likely to require a change in the business operations, requiring management input.	department operates. These alterations are not routine decisions and are the result of careful management action.	
3	26	Implement appropriate internal controls	22, 25	27	The required internal controls will be implemented into operations of the business by amending any current processes, whether they are manual or automated. The act of implementing the controls will be manual as the necessary changes may be different from system to system.	No. Determining how to implement the controls will involve analysis of the existing systems and deciding an appropriate method of application.	No. The process will involve manually implementing the required controls in the business using suitably skilled individuals. As the organisation will consist of multiple different systems, automation of this is not feasible.	N/A
3	27	Monitor that the plans and controls allow the achievement of the desired changes and benefits	18, 25, 26	28, 29	Management will have review sessions to identify the progress of the department or organisation. The performance both before and after the plans and controls can be compared to identify whether they are achieving their	No. The activity may involve subjective discussions regarding the progress of the organisation towards the achievement of an intangible benefit.	While some desired changes many include increased profits or sales, others may be intangible and numerically immeasurable. This type of monitoring cannot be automated.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					objectives.			
3	28	Take control action to ensure plans and controls allow achievement of changes and benefits	27	-	If it is determined that a particular plan or control is not allowing the achievement of a desired benefit, management will try to identify required changes to plans to ensure that they lead to the desired outcome.	These decisions would involve uncertain data, especially when dealing with intangible benefits. Therefore it would be difficult to develop an algorithm to output the best possible decision.	No. Management action is required to analyse the data and derive the most suitable solution.	N/A
3	29	Monitor that the achievement of changes is resulting in the realisation of strategic goals and vision of the board	14, 18, 27	30	The Board will regularly review the performance and progression of the organisation and determine whether the benefits are allowing the business to progress towards the vision.	This activity would take place in a strategic meeting and would require discussion of whether the benefits are enabling the organisation to progress towards its vision.	No. The activity will involve some subjective analysis of the progress of the organisation with regards to intangible benefits.	N/A
3	30	Take control action to ensure changes result in the realisation of goals and vision	29	-	Management will determine whether the desired changes are suitable to allow the business to progress towards the vision of the Board.	Any control actions required are very much unstructured decisions and will require analysis to derive the best solution to the problem.	No.	N/A
3	31	Determine how to assess the competitiveness of the business	-	32, 34	The individuals responsible for assessing the competitiveness of the business will determine the intelligence required and how it can be assessed.	No. The determination of an assessment method will involve consideration of various techniques to derive a suitable method.	No.	N/A
3	32	Identify the desired level of	31	34	By analysing relevant	Determining the	It would be possible to	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		competitiveness			data, such as competitor market share, the decision-makers are able to identify the desired state of the business.	aspiration level for competitiveness requires analysis of competitors as well as the organisation itself to derive suitable targets.	develop an algorithm to identify some factors, such as desired market share, but competitiveness also includes a number of other factors that may not be measureable. The existing process of identifying the level to which the business operates at is sufficient while also not a regular occurrence.	
3	33	Assemble intelligence regarding competitiveness	13	34, 273	Most businesses will undertake some form of competitive intelligence activity and it involves 'competitive benchmarking' with other organisations [38]. Assembling intelligence is often already automated in major banks and would require some sorting to retrieve the relevant competitive data.	Algorithms already exist to gather intelligence from the external environment on a periodic or continual basis. Once collected, it would be relatively easy to filter out irrelevant data and be left with competitive intelligence.	Information gathered during the bank employee interviews showed that automated systems already exist and are in operation in today's banks.	Continual automated analysis of the relevant data will allow the business to identify possible risks and opportunities regarding competitiveness before they become obvious. This is also known as 'early signal analysis' [38].
3	34	Identify gap between current and desired competitiveness	31, 32, 33	35, 36	Analysis of financial reports produced by competitors will show their current position and allow the organisation to identify	Yes. The current state of the gap in competitiveness can be identified by regular comparison of the desired and current	Yes. Many comparison algorithms exist today and would be able to identify the gap periodically to determine if it is	Banks currently employ teams to analyse competitor data on a regular basis to determine whether the organisation is

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					where they would like to be. The gap between this desired level and the current level of competitiveness can then be identified.	levels as long the data is quantitative.	increasing or decreasing. The system would require some manual input of the initial desired levels and any alterations to those levels.	competitive in comparison. Automating this system to produce relevant and regular reports will mean the manual task is no longer required.
3	35	Determine how to reduce gap in competitiveness	34	36	Once the gap in competitiveness is identified, management will discuss what action would be suitable to reduce the gap.	No.	This activity will require management input as it is trying to identify possible actions. Since these actions have not yet been identified, this system cannot be automated.	N/A
3	36	Reduce gap in competitiveness	34, 35	37	Once relevant actions have been identified by the Board or management, the appropriate actions are circulated throughout the organisation. Aiming to reduce the gap in competitiveness can involve strategic decisions or the development of new products.	No. These decisions are often strategic and will be the result of careful consideration by the decision-makers. The decisions may also have a significant impact on the way the business operates.	Since reducing the gap in competitiveness with other banks may require strategic alterations involving the Board, automation of this activity is not desired.	N/A
3	37	Monitor that the gap between current and desired competitiveness is being reduced	36	38	Once the identified actions have been put in place, the business can monitor the gap by analysing appropriate	Yes. This activity involves the measuring of the current competitiveness of the business and comparing it to where	It would be possible to automate this system with algorithms to monitor the state of the business periodically and	Teams of analysts are currently employed in each business function in major banks to monitor the

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					data periodically. The normal method of this is to have teams of analysts producing regular reports on the performance of the organisation and its competitors.	the business would like to be. This would likely take place on a periodic basis.	produce appropriate reports for management.	competitive nature of the organisation. Automating this system would allow the business to significantly reduce human resource overheads and quickly produce reports as and when required.
3	38	Take control action to ensure the gap in competitiveness is being reduced	37	-	If the regular reports into the performance of the business show that action is required, management will meet to determine and action an appropriate response.	No. Strategic plans may require alteration to ensure the business operates on a more competitive basis.	Automating this system would not be desired as the decision is of major importance to the future of the organisation. Many decisions will also be uniquely derived from the identified problem and would not be programmable.	N/A
4	39	Define the external environment	13	40, 41, 42, 43, 44, 56, 100, 347	Using intelligence gathered and assessment from the environment, the business is able to identify the external environment relevant to the organisation. This activity is usually done by strategic or marketing teams.	The activity will involve the analysis of the current environment and determination of what is relevant to the organisation.	Although automated intelligence assessment can be used, new threats, opportunities and risks will arise regularly that an automated system may not recognise. The importance of knowing the environment may mean that manual analysis is still preferred.	While automation may be possible, previously unidentified threats and opportunities to the business may not be recognisable to an automated system. Acknowledging certain factors at a late stage can have damaging effects on an organisation.
4	40	Define dynamic with respect to the external environment	40	4, 44, 100	A dedicated team will analyse the market	Determining the dynamic nature of the	Yes. Automated intelligence systems can	Automated systems will be able to continue

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					intelligence to determine any fluctuating trends. Identifying these trends will allow the business to see how often the environment changes. Automated market intelligence systems are often used to analyse the data on a continual basis to determine these trends.	environment is possible using a statistical analysis algorithm and historical data to identify trends.	identify the regularity of change within the environment and produce appropriate reports on this.	to deliver information on the dynamic state of the environment for use when required. Manual systems will require data analysis each time to determine if the business is operating in a more or less dynamic environment than before.
4	41	Define the scope of the financial industry	40	8, 44	Banks offer a wide range of financial services but occasionally may expand into new areas, such as Will Writing Services. Analysts are used to identify this scope.	The results of the activity are unlikely to be reviewed for a significant amount of time as the industry is fairly static. Most changes seen in this field are regulatory or related to competitor products and operations.	Automation of this activity is not required as it will not take place on a regular basis.	N/A
4	42	Define customer activity and requirements	40	8, 44	Market intelligence will be used to define a customer profile and identify their needs. Some banks already operate automated systems in this field.	Algorithms exist to analyse large amounts of data to create a customer profile in a short amount of time.	Software by Quant Interpretations already shows that customer profiling can be automated to produce output in seconds [36].	Automation of this system can replace the need to employ expensive market research teams or analysts to produce customer profiles, while the output is also almost instantaneous compared to the length of time that physical research requires.

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4	43	Identify competitors and their operations	40	8, 44	Analysts will gather competitive intelligence to determine how the competitor operates. However, many systems will be symmetrical throughout the industry due to high levels of regulation.	To some extent. This activity would involve the completion of numerous steps to gather the relevant information. However, many of these steps may require a physical sampling of the services offered by competitors.	Automated intelligence gathering technology already exists and can easily find out the competitors on the market and the products that they offer. However the only way to gather intelligence on the operations of these businesses is to personally sample it by using the services provided.	No matter how much and how quick automated systems can gather information on competitors, it cannot retrieve the information that is most useful to an organisation, such as how the business operates in its branches, research, product development etc. Automation is feasible for part of this activity but human input is still highly desirable.
4	44	Assess the impact of the dynamic external environment on the business	39, 40, 41, 42, 43	45	Analysts will assess each environmental factor for their impact on the organisation. This analysis will be reviewed on a regular basis to identify any changes.	Each factor may have differing effects on each area of the organisation, making it difficult to develop a suitable algorithm.	No. The current process of manual assessment of the environmental impact, while slow, is thorough and allows for all possible scenarios to be catered for.	N/A
4	45	Decide how to identify risks and opportunities from the external environment	44	46	The appropriate decision-makers will discuss all possible options of identifying risks and opportunities before choosing a suitable method.	No.	No. The activity requires discussion of appropriate techniques to derive the optimal strategy for identifying risks and opportunities.	N/A
4	46	Identify risks and opportunities to the	45	47, 48	Dedicated teams will analyse environmental	The process of risk identification involves	It would prove difficult to fully automate this	Automated systems may not adequately

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		organisation from the environment			information to identify risks and opportunities relevant to the organisation.	the identification of assets and their threats and vulnerabilities while potential opportunities stem from the assessment of market intelligence.	system as opportunities are often unique situations that have not arisen before, such as the potential acquisition of a recent but successful start-up company. Automated systems do currently exist however for automated risk management procedures [39].	identify appropriate risks to the business until they are obvious. As opportunities are often unique situations, some may not be identified by the programmed algorithm.
4	47	Decide how to respond to risks and opportunities	46	48	Management will determine how a response is made to a risk or opportunity. For example an appropriate method may be to arrange a meeting with appropriate personnel to evaluate the risk or opportunity with the aim of developing a suitable action.	The activity of choosing how to respond to risks and opportunities needs to be manual and involve appropriate personnel to derive a suitable solution.	No. While this activity itself cannot be automated, the output of it may be to develop an automated system.	N/A
4	48	Respond appropriately to risks and opportunities	46, 47	49	Risk teams are employed to analyse risks and develop suitable solutions. Opportunities are individually evaluated for their worth with an appropriate response as the output. Once a	Using inputs of relevant data, safeguards and policies, a risk engine can produce appropriate reports and control recommendations based on a particular set of standards [39].	Automated risk management tools evaluate each risk for their likelihood and impact and provide recommendations for appropriate controls. The unique nature of opportunities may mean	Automation will use appropriate business rules to ensure that risks are dealt with correctly and assets conform to the relevant governance. Automating opportunity

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					decision has been made, it must be communicated effectively throughout the organisation and implemented effectively [40].		that a manual assessment of their worth is still the most suitable method.	assessment and response is unlikely to be feasible as each opportunity has to be assessed on its own merit and different outcomes may be derived depending on the current situation.
4	49	Monitor the appropriateness of response to risks and opportunities	48	50	Management will regularly meet to review the results seen from the responses to risks and opportunities.	No. Each risk or opportunity decision made must be individually evaluated to determine whether the response was appropriate.	No. Management or appropriate personnel will assess decisions periodically to review whether it is in the best interests of the organisation to persist with the original decision.	N/A
4	50	Take control action to ensure appropriate response to risks and opportunities	49	-	Any previous inappropriate response to a risk or opportunity will be identified and analysed to see where mistakes were made. This will try to ensure that similar mistakes are not made again in the future.	No.	No. Once the decision has been assessed, management can make an informed decision to ensure any future responses are appropriate.	N/A
4	51	Identify the decision-making activities of the organisation	Act Info	52, 53	This activity is not explicitly undertaken in banks. Each decision is identified as and when required. Many high-profile decisions made in	No.	No.	N/A

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					banks are made by committees rather than individuals.			
4	52	Determine how market intelligence gathering and assessment will assist the decision-making activities	51	53	Each decision will require some intelligence to allow for an informed decision to be made. The relevant information and how it will assist the decision will be identified in one of the initial stages of each decision.	No. Especially with decisions that involve the Board or are strategic in nature, the type and amount of information required is essential and is the result of much deliberation.	No. Each decision will require a bespoke information set and how it can assist the decision will be determined by the decision-makers themselves.	N/A
4	53	Exploit the assessed intelligence to aid decision-making activities	13, 51, 52	54	Business Intelligence software is used to inform better decision-making in organisations [41]. The required information is retrieved from the database to aid the decision-makers.	Business intelligence software employs various algorithms to analyse large amounts of data to produce the required reports. Queries can be automatically initiated regularly but irregular decisions may require bespoke queries to be written by hand.	Yes. Relevant intelligence can be combined using appropriate queries to automatically produce the required output for regular decisions.	An automated business intelligence system can provide easy access to the required data to assist decision-making. Uncommon queries may be occasionally required and will need an employee with the appropriate technical capabilities.
4	54	Monitor that the gathering and assessment of market intelligence is assisting the decision-making activities	53	55	The decision-making process may be manually reviewed in the case of a poor decision. As long as the outcomes of decisions are favourable for the organisation, this activity will not be undertaken.	No. This activity does not routinely occur in an organisation.	No. In reality this activity is only undertaken if the organisation suffers from the effects of a poor decision. Until this is the case, the original selection of information is considered appropriate.	N/A

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4	55	Take control action to ensure intelligence is assisting decision-making activities	54	-	In the case of poor intelligence leading to an inappropriate decision being made, the root cause will be analysed by a dedicated individual or team and fed back to management. The result of this should correct any errors and ensure that similar mistakes with intelligence are not made again.	No. Any mistakes would not have been previously identified and could not have been programmed. Requires subjective analysis of the information used.	No.	N/A
5	56	Identify existing legislation and other relevant external factors	39, 346	57	The intelligence gathered on the environment is assessed to identify relevant factors. Banks employ compliance teams to identify legislation and are also subject to regular audits to prove compliance.	Routine tasks can be identified to undertake the activity of identifying appropriate factors.	It may be possible to automate the identification of relevant external factors based on the market intelligence but legislation does not see regular change and would not require automation for identification.	Legislation in the banking industry does not see significant change and therefore would not require identification automation. The identification of external factors is partially automated in some of today's banks with automated market intelligence gathering and assessment.
5	57	Identify new or amended legislation and other relevant external factors	56	58	Compliance teams and auditors monitor regulation for change. Changes in other external factors are often highlighted in the	No. Any changes can only be identified as and when they occur.	No. Any significant changes to an industry the size of the banking industry are communicated direct to the businesses as well as	N/A

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					ongoing market intelligence gathering.		in the press.	
5	58	Determine the effect of the changes on the organisation	57	60	Compliance team, auditors and other appropriate personnel will evaluate the changes to determine the extent of the impact on the organisation.	Yes. With the modification of business rules, an algorithm could be defined to state whether or not a particular process conforms to the new legislation.	It would be possible to develop an automated system to determine whether systems still conformed to the relevant regulation.	With the size of a banking organisation, checking that every system conforms to new regulation will be considerable task. However initially programming a system with every task seen in an organisation is a more substantial task and may not be beneficial in the long term.
5	59	Identify existing business processes within the organisation	-	60	The task of identifying every task in a bank is not undertaken explicitly. Each process in a bank is covered by the relevant procedure documentation.	No.	No.	N/A
5	60	Determine the existing processes that are affected by the identified changes	58, 59	61, 63	Any change-affected processes not recognised by the bank compliance team will be identified during the regular audits that occur.	Yes. An algorithm with the amended business rules could identify the processes that no longer conform to their requirements.	Yes. Automated compliance systems can determine the systems that will be affected by the identified changes.	Automation will replace the need to manually check each business process. Initially programming an automated system of the type would require considerable effort and time and therefore cost.
5	61	Determine whether the	60	62	Change management	No. Each change will	FootPrints Change	While the Change

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		changes can be appropriately incorporated into the business			teams will identify the most appropriate way to incorporate the required changes into the organisation. Output of this activity may be to develop a new process or to alter an existing process.	require analysis of a particular system to determine whether it can be incorporated effectively.	Manager is an automated tool allowing a business to report and control change and approvals based on existing business processes [42]. Each proposed change needs appropriate management sign-off.	Manager does not explicitly define whether a change can be incorporated into a system, it does allow any proposed changes to be communicated to the relevant management for an informed decision to be made.
5	62	Define how to incorporate the changes into the existing business processes	61	63	Change management teams will analyse the requirements and existing processes to identify the most suitable method of incorporation.	No. Each change will have different requirements for processes.	FootPrints Change manager allows employees to suggest appropriate solutions which can then be evaluated by management.	The Change Manager allows each request to be reviewed but the whole activity cannot be automated.
5	63	Amend the identified processes to accommodate the changes	60, 62	64, 67	Change management teams will coordinate the implementation of the required changes with minimal impact on the organisation's productivity.	Each process requiring change is likely to need altering in different ways, requiring human input.	No.	N/A
5	64	Monitor that the process amendments are sufficiently accommodating the changes	63	65	Compliance teams and auditors will regularly check systems for their compliance with requirements, standards, legislation and policies.	The post-change processes can be monitored for compliance with the requirements.	Yes, automated monitoring systems can determine whether the processes are remaining compliant.	Automated monitoring of these systems will enable any faults to be highlighted when they occur. Manual checking of the compliance of each process is a considerable task.

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5	65	Take control action to ensure the processes sufficiently accommodate the identified changes	64	-	In the case of continuing non-compliance, management will allocate the activity of ensuring compliance to appropriate personnel.	No. The situation will only occur when non-compliance still exists.	No. The activity will require human input to ensure compliance and that the same mistakes are not made again.	N/A
5	66	Define desired levels of operation for the organisation	-	67	The Board and senior management will discuss and agree upon the desired levels of operation for each area of the organisation.	No. The activity will involve subjective analysis of the organisation to derive desired levels of operation.	No.	N/A
5	67	Monitor that the organisation is operating as desired after accommodating the required changes	63, 66	68	Management will discuss the performance and operation of the business in a regular review meeting, comparing performance both pre and post change.	As long as the measures of desired operating level were quantifiable, an algorithm could be developed to monitor the current levels with the desired levels.	Yes, an automated monitoring system could be developed to assess the quantifiable performance and operation measures in comparison with the desired levels.	Automation could only be achieved if the operation measures were tangible. Automation would allow any downturn in operation efficiency to be seen earlier than a manual process.
5	68	Take control action to ensure the organisation is operating as desired	67	-	Appropriate management action would be identified after analysis to amend the business operations to current levels.	No. The monitoring of the operating level would be a regular process but any necessary control action would be dependent on the situation itself.	No.	N/A
6	69	Define the desired culture and working environment of the organisation	-	74, 76, 252, 330	Defined by the Board and upper management, using the vision as a target.	No. The desired culture and working environment has long-term relevance and the activity would only take place once over the long	No. The desired culture and working environment is derived from the vision of the Board and is of high importance. Therefore	N/A

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						term.	automation would not be recommended.	
6	70	Identify the organisation's values and objectives	-	71, 72	The Board, responsible for the operating of the business, will develop a set of objectives and values based on the vision and environment that the organisation exists within.	No. The values and objectives will be made public and have long-term relevance for the organisation. The development of these will involve substantial discussion and evaluation.	No.	N/A
6	71	Decide how to publicise the values and objectives throughout the organisation	70	72	The appropriate personnel will analyse the content to be publicised and the structure of the organisation itself to develop a suitable publication method.	No. The activity will not be undertaken often and will involve discussion around possible options.	No. The determination of method cannot be automated but the resulting method itself could be an automated system.	N/A
6	72	Publicise the values and objectives throughout the organisation	70, 71	73, 74	Business values and objectives are publicised throughout an organisation by things such as dress code, workspace management, amount of management communication etc.	No. The values and objectives of a business are often intangible factors that can only be publicised through management interaction with employees.	No. Making employees aware of the business values and objectives is usually achieved through the way management operate and interact with employees in order to set an example.	N/A
6	73	Assess existing culture and working environment	72	74, 76, 78	Many companies assess the existing culture by using surveys and focus groups to gather feedback from employees [43]. I have personally experienced	Yes. The process may involve the development and circulation of an appropriate set of questions to allow for sensible answers that can be analysed to	Yes. This process can be automated to periodically ask employees for feedback, collate the responses and build reports based on the data.	The manual collection of employee feedback is a lengthy process and an automated system could deliver a massive response far more quickly.

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					this in the form of quarterly employee questionnaires at Halifax.	determine what employees think of the existing culture and working environment.		However, to ensure that the questionnaire is appropriate for that point in time, human input may be required to develop the most suitable set of questions, although the scope of possible feedback will be limited if using this method.
6	74	Monitor that the publicising of the values and objectives throughout the organisation results in the formation of the desired culture and working environment	69, 72, 73	75	This information is likely to be gathered by carefully developed questions in employee surveys to determine whether the values and objectives are known and are delivering the desired culture and working environment.	An algorithm could be developed to circulate an employee survey and collate the results. However, some further analysis on intangible assets would be required.	The process can be partially automated with the development and circulation of an employee survey but since the desired culture and working environment are intangible assets, some form of physical analysis of the results would be required.	Automation of the data collection would reduce the need for employee feedback sessions and allow employee time to be spent productively elsewhere.
6	75	Take control action to ensure the publication of values and objectives results in the desired culture and working environment	74	-	In the case of the publication of values and objectives not achieving its objective, management will meet to discuss the situation with the aim of determining a suitable solution.	No. No pre-defined solution is likely to exist.	No. Management input and evaluation is required to develop appropriate solutions to the problem.	N/A
6	76	Monitor that the desired	14,	77	Upon determining that	No.	No. This activity would	N/A

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		culture and working environment results in the business departments working coherently towards the vision of the shareholders and board	69, 73		the business is achieving the desired culture and working environment, managers can assess whether this is allowing the business to progress towards the vision for the organisation.		require some analysis by the Board to determine whether the business is progressing towards the vision. Many vision objectives are intangible such as Lloyds' 'become a more agile organisation'.	
6	77	Take control action to ensure the desired culture and working environment resulting in progress towards the vision	76	-	This activity would involve the Board meeting to discuss the performance of the business and developing suitable solutions to ensure this takes place.	No. These decisions are unstructured and no standard solution would exist.	No.	N/A
6	78	Monitor that the culture and working environment facilitates the creation and provision of financial services products which satisfy the perceived needs of the public	73, 109	79	Upon determining that the business is achieving the desired culture and working environment, managers can assess whether this helps the creation of appropriate products. This activity is unlikely to be explicitly undertaken in the real world.	No.	No.	N/A
6	79	Take control action to ensure the culture and working environment facilitates the satisfaction of public needs	78	-	This activity would only be undertaken if the existing culture results in the development of products that do not satisfy public needs.	No.	No. Any management action derived from this activity would be to ensure that suitable products are developed that meet the public needs.	N/A

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7	80	Define a customer	-	82, 85	While this activity is not explicitly done in banks, dedicated teams and automated systems are used to derive profiles of customers.	The definition of a 'customer' may be undertaken by the market research team but each individual customer will have a profile generated showing their current status with the bank. This involves the collection of various pieces of information.	Software from Quant Interpretations has shown that automated customer profiling is possible and provides numerous benefits to a business [36].	Customer profiles and reports can be generated in seconds where the previous manual system could take months to generate any meaningful information. This system would also replace the necessary cost of using external market research companies.
7	81	Identify the product areas relevant to the organisation	-	82	The determination of which product areas to operate in is a strategic decision and requires sign-off by upper management or the Board.	No. These types of decisions do not occur often and the outcome has a significant impact of the direction of the organisation.	No. Management and Board discussion is essential.	N/A
7	82	Identify the desired customer base in each product area	80, 81	83	Analysts will review relevant intelligence of current market share and that of competitors to identify the desired customer base for each product.	Yes. This activity will involve the statistical analysis of internal and competitor data to determine desired levels.	Yes. Statistical algorithms can be implemented to regularly review this information to determine the desired market share for a product.	Teams are currently employed to analyse this type of data to make these decisions. Automation of this system would lessen the need for additional human resources.
7	83	Determine how to achieve and maintain desired customer base	82	84, 89	Management teams will discuss the possible solutions to employ to be able to achieve and maintain desired levels.	No. These decisions are strategic in nature and may affect the types of products that are developed and the way	No.	N/A

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						the business operates.		
7	84	Determine what information is appropriate to aid the maintaining of the desired customer base	83	87	The relevant decision-makers will identify the required information to aid the chosen method.	There may be an aspect of PD in that if one activity is necessary, then certain data is required etc.	Yes. The activity would follow business rules and therefore an algorithm could potentially be developed.	While automation would be possible, the activity does not require much human input to be done effectively manually. Automation of this system alone may not be beneficial but this may not be case if the actual retrieval of information is also automated.
7	85	Define what is meant by a new customer	80	86, 89	The term is self-explanatory and therefore the activity is not undertaken in the real world.	No.	No.	N/A
7	86	Determine what information is appropriate to identifying and attracting potential customers	85	87, 88	The relevant decision-makers will identify the required information to aid the chosen method.	There may be an aspect of PD in that if one activity is necessary, then this data is required etc.	Yes. The activity would follow business rules and therefore an algorithm could potentially be developed.	While automation would be possible, the activity does not require much human input to be done effectively manually. Automation of this system alone may not be beneficial but this may not be case if the actual retrieval of information is also automated.
7	87	Obtain appropriate information	84, 86	89, 93	Lloyds, for example, use Business Intelligence	Yes. The process would follow business rules	Yes. Once the system has identified the	Automation of the system, possibly

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					software to query a database to retrieve any necessary information to aid decision-making or for reporting purposes. However these queries utilise very large databases and can take up to an hour to run.	retrieve data that is identified as required. The results can then easily be output as required.	information that is required, automated queries could retrieve the data.	alongside the actual determination of relevant data would replace the need for manual queries to be run on the system while ensuring that the data is then available on request.
7	88	Decide how to exploit the appropriate information	86	89	Decision-makers will determine how to use the data once it is obtained.	No. Each decision to make will be assessed individually to derive the most suitable solution.	No. The determination of the appropriate method cannot be automated but the resulting selection may be an automated system.	N/A
7	89	Exploit appropriate information to identify potential new customers	83, 85, 87, 88	90	Marketing teams will identify new demographics of the public that could be potential customers.	Yes. By analysing the appropriate information, potential sets of customers could be identified, ready for targeting.	While research has shown that no similar systems exist, the activity follows rules that theoretically could be automated.	Automation can identify and target potential customers in minutes.
7	90	Monitor that the exploitation of appropriate information is resulting in the identification of potential new customers	89	91	Management will review the process of potential customer identification and determine whether it is operating at optimum levels.	If the process had a desired amount of customers to identify, a simple comparison between the actual amount and the desired amount can be made.	Yes. The system would identify potential customers as normal and compare this to the desired level to determine whether it is operating as required.	The system would replace the need for manual checking of the efficiency of the process.
7	91	Take control action to ensure new customers are identified through the exploitation of appropriate information	90	-	If it is recognised that the process is not operating as desired, management would allocate the role of	The activity of identifying an error and sending a record of the problem to an appropriate member of	While the physical act of amending the process may not be able to be automated, the system could automatically	Automatic problem identification and circulation to appropriate personnel would result in the

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					solving the problem to appropriate personnel.	staff is an example of a PD.	generate a problem request and send to the appropriate person as soon as it is identified.	problem being fixed before it has any lasting effect of the business. Waiting for a manual check that may not be scheduled for some time may mean the current system is operating inefficiently for long periods.
7	92	Determine how to attract identified potential customers	-	93	Decision-makers will determine how to use the data once it is obtained.	No. Each decision to make will be assessed individually to derive the most suitable solution.	No. The determination of the appropriate method cannot be automated but the resulting selection may be an automated system.	N/A
7	93	Exploit appropriate information to attract identified potential customers	87, 92	94	Marketing teams or automated systems will publicise the organisation's products or contact potential customers directly to try to attract them to become customers.	Yes. Once identified as a potential customer, they can be automatically targeted through direct mailing, telephone calls or other methods.	Automated marketing tools already offer direct mailing services and web presence marketing to attract customers [44], while ATM machines now routinely display personalised marketing information [45].	Automation offers the business new avenues to attract customers and can replace the cost of employing direct marketing teams.
7	94	Monitor that the exploitation of information is attracting potential customers	93	95	Management will review the process of attracting potential customers and determine whether it is operating at optimum levels.	If the process had a desired level of identified potential customers to attract, a simple comparison between the actual amount and the desired amount can be made.	Yes. The system would operate to attract potential customers as normal and compare this to the desired level to determine whether it is operating as required.	The system would replace the need for manual checking of the efficiency of the process.

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
7	95	Take control action to ensure that the exploitation of the appropriate information is attracting the identified potential customers to the bank	94	-	If it is recognised that the process is not operating as desired, management would allocate the role of solving the problem to appropriate personnel.	The activity of identifying an error and sending a record of the problem to an appropriate member of staff is an example of a PD.	While the physical act of amending the process may not be able to be automated, the system could automatically generate a problem request and send to the appropriate person as soon as it is identified.	Automatic problem identification and circulation to appropriate personnel would result in the problem being fixed before it has any lasting effect of the business. Waiting for a manual check that may not be scheduled for some time may mean the system is operating inefficiently for long periods.
8	96	Define the current financial needs of the public	3	97, 101, 105, 115	Market intelligence will be used to determine what the current financial needs of the public are.	No. While the activity may involve the analysis of data, which could be automated, some subjective decision-making may be required.	While the process could be automated, knowing the needs of the public is of great importance to any business and influences strategic decisions. Therefore, automation may not be suitable.	Attempting to automate this process may result in strategic errors being made if poor data is used.
8	97	Determine how to identify desired levels of product distribution and adoption based on the public's financial needs	96	123	The determination method will be discussed by appropriate personnel to derive the most suitable solution.	No. This decision will have long-term effects on the way the business operates and will not be reviewed unless problems are identified.	No.	N/A
8	98	Decide how to identify the non-financial needs of the bank's customers	-	99	Decision-makers will discuss the merits of possible solutions to identify the most	No. This type of decision will not be made often and the resulting solution will be used	No.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					suitable.	long-term unless problems are identified.		
8	99	Identify the non-financial needs of the customers	98	100, 101, 105, 115, 251	Market intelligence and customer surveys will be used to determine what the current non-financial needs of the public are.	No. While the activity may involve the analysis of data, which could be automated, some subjective decision-making may be required to determine intangible needs.	While the process could be automated, knowing the needs of the public is of great importance to any business and influences strategic decisions. Therefore, automation may not be suitable.	Attempting to automate this process may result in strategic errors being made if poor data is used.
8	100	Assess the dynamic effect of the environment on the overall needs of the public	39, 40, 99	101	Market intelligence assessment is an ongoing activity that identifies changes in public needs. The activity is undertaken by both dedicated market research teams and automated intelligence systems.	Yes. Analysis of the environmental changes and comparison with previously identified customer needs will show whether the needs are still relevant.	While the process could be automated, knowing the needs of the public is of great importance to any business and influences strategic decisions. Therefore, automation may not be suitable.	Attempting to automate this process may result in strategic errors being made if poor data is used.
8	101	Monitor that the assessment of the effect of the environment is resulting in appropriate customer needs being identified	96, 99, 100	102	Ongoing market intelligence and customer feedback will identify the extent to which customer needs are being correctly identified.	Measurable factors can be monitored through the use of algorithms but those intangible factors will still require human analysis.	The system can be partially automated to determine whether some appropriate needs are being identified. Intangible factors would require subjective analysis by humans to determine whether control action is required.	The identification and assessment of customer needs is an important and continuous task for a bank to remain competitive. Having an automated system in place to identify environmental changes and possible errors in customer needs would offer a major

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
								competitive advantage.
8	102	Take control action to ensure appropriate customer needs are being identified	101	-	Management will review the situation to identify where the problems lie and attempt to derive appropriate solutions.	No. These decisions are not routine and will only occur when required. Pre-defined solutions to be problem are unlikely to exist.	No.	N/A
9	103	Define timely in respect of the provision of financial services products	-	109, 140	Analysts will study market intelligence and internal factors to determine what customers would like to see and how the business can provide products and management will use this to develop desired provision times.	No. Unless the technology that the company uses drastically changes, the capability of timeliness of the product provision will not change. Therefore this activity will not take place regularly	No. Since the activity will not be a regular occurrence, automation would not be beneficial.	N/A
9	104	Identify the potential market for products	13	105	Market intelligence analysts will identify competitor market share and determine achievable levels for the organisation while also considering customer profiles.	Yes. To identify the potential market, data on competitors and internal capabilities can be analysed using statistical algorithms to derive achievable levels.	Yes. Algorithms can output desired market share from the analysis of competitor data and Quant Interpretation's software [36] has already shown that customer profiling with potential product needs can be automated.	Automated market identification can provide up-to-date estimations of achievable market share predications. The current manual process uses forecasting that is done a year in advance to identify these levels.
9	105	Determine what financial services products are appropriate to meeting the public's needs	96, 99, 104	106, 107	After identifying the public's needs, senior management determine what types of products	No. The decision of what types of products to offer has major significance on the	No. Since the activity will not be undertaken often and is of high importance, automation	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					are required to satisfy those needs.	strategy of the organisation and will have long-term relevance.	is not desired.	
9	106	Decide on appropriate ways to operate products for customers and the organisation	105	109, 141, 156	During product development, appropriate personnel discuss possible methods of product operations before deciding on suitable selections. Most products in the real world can be operated in branch, by telephone or online.	No. The activity will involve the analysis of the specific product to determine the suitable ways to operate the product. Since new products are not launched regularly, developing an algorithm for this activity would not be cost effective.	No. Since new accounts are not launched regularly and there is a limited amount of ways of operation, the activity is undertaken quickly and effectively during product development. Therefore automation is not required.	N/A
9	107	Determine how to generate income from the provision of products	105	108, 109, 186	Using the requirements of the new product, the decision-makers determine this by analysing various options and selecting the most suitable.	Depending of the requirements of the product, business rules can be applied to the decision. For example, if regular income was required, the application of a monthly fee may be suitable.	While business rules can be applied to automate the process, new innovative products are the way to gain a competitive advantage in the banking industry.	Automating the process may mean that new innovations are not identified and brought to market first by competitors.
9	108	Identify average profit targets for each product area	107, 349	109, 120	Using the overall financial targets of the business, the product developers can determine the average income gained from a properly operated account.	The activity would involve several calculations of product split and contribution to overall financial performance.	The activity could be automated to generate the required output, but automation may not be necessary.	Since new products are not released often by banks, the calculation of this factor can be efficiently done manually. Automating the process would not be cost efficient in the long term.
9	109	Develop a range of suitable	103,	78,	Using the appropriate	While the completed	While the checking of	New products are not

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		financial services products	106, 107, 108	110, 112	information from employees, customers and intelligence, dedicated product development teams design and create suitable products to satisfy requirements, while ensuring they also conform to the strict regulations [46].	product must be checked for compliance with regulations and suitability to satisfy needs, the actual product development requires extensive analysis and thought to derive the most suitable result.	the final product can be automated, the actual design of a product is critical to the success and reputation of an organisation and appropriate amounts of human input should be provided.	developed continuously by banks and therefore automation of this system would not be cost effective. It may also not be desirable to many senior management personnel as the task should be completed to the highest possible standards.
9	110	Monitor that the developed products are suitable to meet the public's needs and the financial needs of the business	109	111	Before release, the developed products undergo thorough testing and compliance checking to ensure suitability. This will usually be done by the same team who have developed the product.	Yes. As long as a set of rules for conformity to standards and requirements can be derived, an algorithm can be developed to undertake this checking.	Yes. This system would effectively be an automated monitoring tool to ensure that the developed product meets all requirements before it is released. In the case of non-compliance being identified, the error could then be forwarded to the appropriate person.	Automation would ensure that products fully conform to all requirements. However the activity can also be done by the development and compliance teams and the fact that new products are not released regularly means that automation may not be cost-effective.
9	111	Take control action to ensure that the products are suitable to meet the needs of the public and the business	110	-	Any errors are highlighted and passed to the relevant personnel to ensure that the required changes are made to make the product satisfy needs.	No. The decisions made will be unstructured in nature as no solution will exist. This is because the product is new to the organisation and the problem was not	No. The identified error would have to be analysed by the development team before the necessary adjustments are made.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
						previously identified.		
10	112	Identify products offered to customers by the organisation	109	113, 116, 140, 157	The personnel of each business function will be aware of the products offered. Each product is also fully documented. The physical activity of identifying products offered is unlikely to be undertaken in the real world.	No.	No.	N/A
10	113	Identify the features and availability of each product	112	116, 128	Each product will be fully documented, showing the features and availability of each. The products will be well known to relevant personnel and the activity of physically identifying these features is unlikely to be undertaken in the real world.	No.	No.	N/A
10	114	Define regular with respect to the assessment of change to customer needs	-	115	The relevant decision-makers will determine how often customer needs have to be assessed for change.	No. The decision of the regularity of assessment is one that will only occur once unless a change is necessary.	No.	N/A
10	115	Regularly assess customer needs for change	96, 99, 114	116	Market research teams and automated intelligence systems will gather the relevant data to determine whether customer needs have	Yes. The process involves the analysis of large amounts of data from the environment and customer feedback to determine if any needs	Yes. By analysing the new data and deriving customer needs from this, comparisons can be made with previous customer needs to	The size of the data to assess to determine customer needs is massive and an automated system would speed up the

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					changed.	have changed.	determine if any change has taken place.	process of producing customer profiles as well as reduce the need for excess human resources.
10	116	Determine whether existing products offered by the organisation still satisfy customer needs	112, 113, 115	117	Using appropriate data, relevant personnel determine whether current products still satisfy needs.	Yes. The process involves the comparison of new customer needs with the features developed for previous needs.	Yes. Appropriate algorithms and automated comparison tools already exist and are in use.	In a dynamic environment, customer needs may change regularly and being able to identify these changes and unsuitable products will allow the business to amend its product quickly and accordingly.
10	117	Monitor that the existing products still meet requirements	116	118	The suitability of products is monitored in comparison with customer needs and if an error is identified, it is passed to the appropriate personnel to find a suitable solution.	Yes. The process involves the comparison of new customer needs with the features developed for previous needs.	Yes. Appropriate algorithms and automated comparison tools already exist and are in use. In the event of a problem, it can be automatically forwarded to the appropriate person.	Being able to quickly identify unsuitable products and passing this fault to the right person will allow it to be resolved before many complaints are received and the company's reputation suffers.
10	118	Take control action to ensure products still meet requirements	117	-	The identified products and problems are given to appropriate personnel to make the required changes, while ensuring the product is still compliant with other requirements.	No. The changes in needs will be new to the product and therefore no solution will be defined.	No.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
10	119	Assemble financial information for the existing products	112	120, 187	Financial information for products is assembled daily by automated systems and collated for regular monthly reporting. This data exists in a database that can be queried using Business Intelligence software.	Yes. Algorithms are currently in place to collect the necessary information daily. This information is then turned into reports when required.	Automated systems are currently in place that assembles the financial information for each account for the purposes of reporting.	For a bank the size of Lloyds Banking Group for example, who operate millions of accounts, having a non-automated system would be unfeasible to produce the output that is required.
10	120	Determine whether the existing products are meeting the financial targets set	108, 119	121	Each product area will have budgeted and forecasted financial information. Dedicated finance teams report on the performance of products and departments on a monthly basis.	Reports generated for monthly performance reviews compare actual performance against targets and forecasts in an effort to identify ongoing trends.	The system is already partially automated in that the sets of data are compared to identify a performance score.	The automated process replaces the need for a manual comparison of figures where human error is commonplace.
10	121	Monitor that the existing products are satisfying the financial needs of the business	120	122	Each department will have regular reviews of performance to monitor that it is satisfying needs.	Any areas identified in the performance review that need control action are easily highlighted with comparisons and trend analysis.	The system is already partially automated in that the data is compared to identify trends that management can then analyse for potential necessary action.	The automated process replaces the need for a manual comparison of figures where human error is commonplace.
10	122	Take control action to ensure products are satisfying the financial needs of the business	121	-	Where action is required, management will discuss appropriate action in a review meeting and make appropriate decisions.	No. The changes in needs will be new to the product and therefore no solution will be defined.	No.	N/A
10	123	Identify desired levels of	97	124	Management and	To some extent. The	Automated forecasting	Banks employ

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		product distribution and adoption			forecasting teams will identify the desired levels through analysis of competitor market share and other market intelligence.	process will involve the analysis of intelligence to determine appropriate levels of new accounts while management input will be required to identify the desired scope of the product.	systems can be put in place to analyse relevant data to produce a suitable target.	dedicated forecasting teams to analyse data to derive forecasts but this is a lengthy process and even these results can be inaccurate. Having an automated system can deliver quicker and more relevant forecasts with recent developments taken into consideration.
10	124	Determine how to achieve and maintain desired levels of product distribution and adoption	123	133	The relevant decision-makers will review possible methods of achieving the targets and select the most suitable option.	No. This type of decision has an effect on the way the business operates and will not be taken often.	No. Management discussion is necessary to derive the optimum approach.	N/A
11	125	Determine current customer awareness of products	-	126	Market research teams will undertake surveys and focus groups to produce information such as customer interest and awareness as a way of measuring overall consumer awareness [47].	Yes. Much of the measurements to take can have algorithms defined while some opinion-based customer feedback is also desirable.	Yes. Collection of sales data and customer queries can be easily automated while the circulation of customer feedback surveys can also be automated, although the subsequent analysis may require a manual approach.	Market research teams and consultants are currently employed by banks and this extensive, on-going expense can be replaced by the one-off cost of producing an appropriate automated system.
11	126	Determine how to increase product awareness to customers	125	130	Dedicated marketing teams develop marketing strategies in a bid to increase customer awareness of the	No. Each campaign is treated as a single entity and given the appropriate attention to optimise the process.	No. The use of a dedicated marketing team is essential. The output from this activity may however be an	N/A

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					organisation and its products through channels such as TV advertising.		automated process.	
11	127	Define what is meant by publicising of products	-	128	The marketing team will identify certain processes that class as the publicising of products.	No. This activity is only likely to take place once.	No.	N/A
11	128	Define how to publicise the features and availability of products to customers	113, 127	129	The marketing team will identify certain processes that are suitable to achieve the aim of publicising the products to customers.	No. This activity will require expert input to determine the most suitable solutions.	No. The expert marketing team bring the relevant knowledge that mean automation is not desirable. The chosen solution may however be an automated process.	N/A
11	129	Publicise features and availability of products	128	130	Marketing is undertaken by banks in many ways, ranging from branch posters, outbound calling, media advertisements, direct mail etc. The majority of this is coordinated by dedicated marketing teams but previous research and employee interviews has shown that activities such as direct mailing are already automated.	Some aspects involve PD such as direct mailing, while others such as media advertisements require extensive analysis and development. One of the bank employee interviews mentioned that banks are currently researching the possibilities of automated TV screen marketing in branches with the content being purely based on customer and	The process of marketing of products is expansive and as such part of it can be automated while other parts cannot. Aside from automated branch advertising, most other aspects that involve PD are already automated.	Automated marketing allows vastly more customers to be reached than if manual processes were in place. Many banks are spending increasing amounts of money on new marketing techniques and following suit is essential to remain competitive.

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
						environmental data.		
11	130	Monitor that the publicising of products is increasing awareness of products with customers	126, 129	131, 133	By employing market research teams to continually identify levels of customer awareness, management can compare the levels pre and post product publicising.	Yes. The measuring of customer awareness can be automated to some extent and monitoring that marketing is having a positive effect on this involves simple comparisons with any issues being highlighted.	Yes.	Automating this process would reduce the need to rely on market research teams to conduct lengthy analysis to determine whether the publicising of products is working as desired.
11	131	Take control action to ensure publicising of products is increasing awareness with customers	130	-	If it is determined that the publicising is not increasing product awareness, management will advise the marketing team of the action required.	No.	No.	N/A
11	132	Assess levels of product distribution and adoption	140	133	Automated systems currently track the number of new accounts opened each day.	Yes.	Yes. Existing systems are in place to collect the number of new accounts opened in each branch, channel, area, region etc.	Major banks operate on such a large scale that automation of this process is essential.
11	133	Monitor that increasing product awareness is resulting in the achievement and maintenance of the desired levels of product distribution and adoption	124, 130, 132	134, 135	Data is collected both before and after the publicising of products to determine whether it is having the desired effect. If not, relevant management are notified of the problem.	Yes.	Yes. The process could be automated to monitor the number of new accounts in comparison to the targets for each area and notify appropriate personnel when an issue arises.	An automated system would replace the need for manual checking of process performance, although any following control action could not be automated.
11	134	Take control action to ensure increasing product	133	-	Once notified, relevant management and the	No. The situation will often require a unique	No. The expertise of the marketing team will be	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		awareness is resulting in the desired levels of distribution and adoption			marketing team will analyse the problem to identify a suitable solution.	solution.	required to develop an appropriate solution to the problem.	
11	135	Identify the benefits to the business of maintaining desired levels of product distribution and adoption	133	136	The desired levels of product distribution and adoption will be derived from the vision and objectives of the Board. Therefore the benefits will also be identified by the board or relevant management.	No. These decisions are strategic in nature and will not occur regularly.	No. Automation would not be suitable as the task would not occur often.	N/A
11	136	Monitor that the maintaining of desired levels of product distribution and adoption are resulting in the realisation of maximisation of benefits to the business	135	137	Management will regularly review the organisation's performance to identify whether certain targets are being met.	Yes. The process would involve the analysis of the identified factors and their ongoing achievement.	Automation may not be possible as some of the benefits may be intangible and therefore subject to discussion rather than measurement.	Automation would remove the need to manual checking of certain performance targets but automating this type of process that may only take place monthly as well as being able to monitor all possible benefits will be difficult and costly.
11	137	Take control action to ensure the realisation of maximisation of benefits through maintaining desired levels of distribution and adoption	136	-	Relevant management will review the problem and suggest appropriate changes to operations.	No. The process will have a significant impact of the operations of the business and no clear solution may exist.	No. An assessment of the individual situation and current environment would be required.	N/A
12	138	Identify possible channels to provide products to the public	-	139	Dedicated personnel will identify the possibilities for each product. For	No. There are no business rules that could be identified to make	No. Each product will have different requirements and the	N/A

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					example, mortgages may not be available online, while car insurance may not available in branch.	this decision. The relevant decision-makers will analyse each product and the potential market accordingly.	activity is only likely to take place during the product development process.	
12	139	Make channels accessible by the public	138	140, 142	An operations team or department will monitor each channel, such as branch, online and phone, and ensure that the availability is not disrupted.	No. Each channel, specifically branches, will require bespoke settings to ensure they are accessible in the immediate environment.	No. Analysis and physical co-ordination of resources is required.	N/A
12	140	Make financial services products available to the public	103, 112, 139	132, 141, 142	The appropriate systems and training are provided to each channel to allow the public to apply for the desired product.	No.	No. Each product is manually added to the repository of accounts that can be physically opened by the customer at that channel.	N/A
12	141	Ensure that customers can suitably operate their accounts via multiple channels	106, 140	142	Each channel is provided with the necessary systems and training to cater for any valid request that a customer makes.	No. Each product and service request will need to be individually incorporated into the systems at each channel.	No. The result of this activity may be the automation of a particular process but the systems are put in place by personnel with the required capabilities.	N/A
12	142	Monitor that the products are available and accessible to the public	139, 140, 141	143	The opening and use of accounts at each channel is monitored with automated systems. Customers can also contact the organisation at any time if any unnoticed issues arise.	Yes. Each channel will have targets for account opening and transactions and any channel that is significantly off target can be investigated to identify any possible	Yes. Systems are already in place to monitor the use of channels. For example, in Lloyds, each automated paying-in machine has target levels of use. If the machine is out of use or	The system provides an automated message if any error occurs so that the problem can be fixed as soon as possible. Without this, it may be some time before the problem is

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
						action.	well below targets, a message is sent to the appropriate person to investigate.	identified and customers may have been dissatisfied with the service during that time.
12	143	Take control action to ensure products are available and accessible to the public	142	-	Relevant management or the operations department will review the problem and take any necessary action to resume normal service.	No. The range of possible problems can be infinite meaning pre-defined solutions are not always available.	No.	N/A
12	144	Define procedures for opening of new account as per banking regulations	346	145, 152	Appropriate personnel develop procedure documents for each account while each employee also requires management sign-off.	Yes. This would involve progressing through the system in individual steps and recording each task. Exceptional circumstances may have to be manually input later.	Yes. The normal procedure for account opening can be automatically documented by defining an algorithm that records each step in the process. Any additional information or exceptional circumstances may need manual input later.	In Lloyds for example, the procedures are held in an online database with thousands of pages. Automating the process of collecting these tasks would ensure that even seemingly irrelevant tasks are documented, leaving a much smaller amount of tasks requiring manual documentation.
12	145	Decide how to assess suitability of customers for specific products	144	146	Appropriate personnel will define a suitability assessment method for each account. The process will be stricter for some products such as mortgages compared to savings accounts.	No. The suitability assessment method chosen will hopefully be used in the long-term if suitable and therefore the decision will not take place often.	No. Automation of this relatively simple, but rare task is unnecessary.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
12	146	Determine factors to identify when establishing customer suitability	145	147	The personnel defining the suitability assessment method will identify relevant factors for each product.	No. The decision on relevant factors will only take place once.	No. Automation of this activity would not be beneficial as the activity would only take place or upon review of the assessment process.	N/A
12	147	Assess the suitability of customers for products	145, 146	148	During each account application, the customer will be both manually and automatically assessed for their suitability. For example, many accounts will require a credit check, which occurs automatically at many banks, while products such as holiday insurance are unsuitable for some high risk or incompatible customers. The bank employee interviews found out that mortgage underwriting at Principality is still a manual process.	Yes. The suitability assessment will follow certain decision rules to identify whether the customer is a suitable candidate for the account.	Automated suitability assessment systems are currently in place to check for the necessary credit score required for certain accounts. Determining the suitability of customers based on other factors can be derived from the completion of a checklist.	Previous manual systems required lengthy analysis of credit files and telephone calls to credit agencies but the results are now available at the click of a button.
12	148	Decide whether to open desired account for customer based on suitability assessment	147	149, 151, 152	Based on the suitability assessment, the advisor or automated system (if done online) will determine whether to proceed with the application.	Yes. The process will involve the checking of the suitability assessment results to determine whether to proceed or not.	Yes. A simple algorithm could immediately determine whether the customer satisfies all criteria to apply for the account. Manual input of customer needs or	The process in place provides an immediate response with regards to the credit check. Automation with the other factors would lead to less flexibility

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
							situation will always be required.	as the system would not allow further progress if a business rule was not met.
12	149	Monitor that accounts are provided based on customer suitability for that product	148	150	The systems used in banks will not continue the application if non-compliance is identified. Post-opening compliance checking is undertaken by banks by manually ringing up random customers after the account has been opened and by allocated personnel manually checking application forms during case reviews.	Yes. The process will follow set rules of checking the application system or form for correctness before determining whether the application itself was correct.	Automated compliance checking is done during the application process. Manual customer contacts can be replaced by an online form sent to every customer that has opened an account.	Automating the post-opening system with the use of online feedback forms may result in more feedback being received as every customer can be targeted as opposed to random sampling. While this may generate more responses, the percentage responses are likely to be smaller. However, customers may not be as receptive compared to speaking to an employee on the phone.
12	150	Take control action to ensure products are provided based on customer suitability	149	-	Unsuitable account openings class as breaches of banking regulations and require management action to rectify past mistakes and ensure correct procedures are followed in the future.	No. This activity will require management action as it is effectively a breach of regulation.	No.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
12	151	Provide feedback as to why account cannot be opened as per regulations	148	-	The advisor or online system will display a message to the customer regarding the outcome. Halifax banking advisors regularly advise customers to check their credit rating if that was the reason for the decline.	Yes. Depending on the reason for declining the application, a standard message can be constructed and output.	Yes. The activity has already been automated and is in use in online banking systems.	The way the activity is currently undertaken does not take much time but manual feedback is required when the customer is opening an account with an advisor either in branch or on the telephone.
12	152	Open account while following defined procedure	144, 148	153, 155, 156, 172	The procedure for each bank is fixed as the advisors or online systems follow set screens, each requiring specific information from the customer.	Yes. Each screen is fixed and therefore will be determined complete once the required information is entered.	Yes. The procedure for savings and bank accounts is already automated online for most major banks. Mortgage applications and some insurance services still require the customer to see an advisor.	The customer is not required to go to a branch, which is often an inconvenience for many people. However, many customers prefer speaking to an advisor as it is more personal and they feel a better service is being provided. Automation will remove this element from the process.
12	153	Monitor that accounts are being opened correctly and adhere to the required procedures and regulations	152	154	Many of the systems used to open accounts are designed so that the process follows the procedure. However all processes, especially mortgages and insurance sales are subject to strict	Yes. The procedure involves the checking of entered data to allowed parameters. If an error is found, an error message can be produced.	Yes. Many banks utilise random compliance checking to ensure certain mistakes are not a regular occurrence. Automation is possible as it would involve the checking of entered	The compliance checking and risk management process is a significant part of a banking organisation and employs many people. Automation will allow all

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					compliance checking.		information to determine whether it is within allowed parameters.	applications to be checked to highlight any issues and reduce the human resources required for the activity.
12	154	Take control action to ensure that accounts are opened correctly	153	-	Risk officers and compliance teams will highlight any errors and take the necessary action to ensure the relevant personnel are aware of the error and the mistake is not repeated.	Yes. Depending on the problem, automated messages can be sent to the relevant personnel advising them of the mistake and any follow-up action required.	Yes. If it was human error, an automated system could output a standard message to the relevant person and schedule follow-up checking. However if the problem was system-based, manual amendment of the process would likely be required.	The relevant person will be notified of their mistake far quicker than if a manual process was in place and this will allow them to alter the way they operate to ensure further mistakes are eliminated.
12	155	Provide funds for new account, if applicable	152	-	Depending on the type of account, the customer or bank may provide funds to the new account or other specified location. In branches this is mainly done by the advisors either manually keying the transaction themselves or processing it at the counter.	Yes. The amount and location for the funds will be specified and will involve a simple transfer or transaction for completion. An algorithm is already in use in online systems for this activity.	Yes. The activity has already been automated online but could potentially be automated for use in other channels too and would only require the input of information to be manual.	In busy times at the branch, advisors are still required to queue to be able to complete their transaction. This leaves the customer waiting, often for long periods of time and takes the advisor away from their main purpose.
12	156	Advise customer as to how to operate account	106, 152	-	Once opened, the advisor will provide the customer with the	Yes. The documentation is readily available and provided to the	Yes. The system is already automated online. However, when	If the customer is dealing with an advisor, physical

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					necessary documentation and answer relevant questions. The online process will generally allow these forms to be printed or automatically sent with the account documentation via post.	customer after the account has been opened.	the customer is opening an account with an advisor, physical interaction is necessary.	interaction is required. Therefore the current levels of automation in the online process may be the only section that can be automated.
13	157	Identify the range of possible transactions on and between all available accounts	112	158, 160	Identified customer needs determine the range of transactions allowed by each bank. This list is fairly static and will only change if new systems and introduced.	No. The range of transactions possible will not be changed regularly.	No. Since the activity will not be undertaken often, automation is not required.	N/A
13	158	Decide how to determine the validity of a transaction request	157, 159	160	The operations team implementing the transaction systems will define the procedures of determining validity.	No. The activity will involve the design and development of suitable processes.	No. The activity will require manual development and once completed, it will not be undertaken again unless a problem is identified or the transaction system is changed.	N/A
13	159	Identify relevant FSA legislation relating to transactions, including verification procedures	346	158	Legal and compliance teams will identify relevant legislation with regards to financial transactions and customer verification.	The process will involve analysing regulation relevant to the banking industry and identifying those sections that relate to transactions.	No. Each regulation will require analysis by a skilled individual. Once done, the activity will not be undertaken again unless the regulations are amended.	N/A
13	160	Determine the necessary processes to allow accounts	157, 157	161	Dedicated operations teams will design and	Yes. The activity will include the identification	No. The process of developing the systems	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		to be transacted on			develop suitable systems to incorporate all possible valid transaction requests.	of necessary tasks for each transaction and the relevant processes to allow each task to be completed.	will require input from skilled personnel. The resulting system may however be automated.	
13	161	Implement processes required for transactions	160	165, 166	Once the systems are developed and fully tested, they will be implemented in each necessary channel by appropriate technical personnel. Once the physical systems have been installed, software updates are often implemented from a central location.	No. Each channel may require bespoke fitting based on the specific setting. Therefore the activity will involve subjective input from personnel with the necessary skills.	No. Even though the processes being implemented may be automated, the process of installing them is manual. Any future software changes can be made by automated updates.	Automated software updates initiated from a central location will replace the need for the manual change on each workstation, saving significant time. This system is already in place in most major banks as networked systems are in use.
13	162	Define an 'account settlement'	-	163	An account settlement is the closure of an account and the closure method of each product will likely be determined during product development.	No. Each new account may require different settlement procedures. The activity will only take when a new product has been developed.	No. This will be undertaken by the product development team and will not occur often, therefore automation is not required.	N/A
13	163	Identify additional required processes for account settlements	160, 162	164	Dedicated operations teams will design and develop suitable systems to incorporate account settlement transactions.	Yes. The activity will include the identification of necessary tasks for each settlement transaction and the relevant processes to allow each task to be completed.	No. The process of developing the systems will require input from skilled personnel. The resulting system may however be automated.	N/A
13	164	Implement settlement processes	163	165, 166	Once the systems and developed and fully	No. Each channel may require bespoke fitting	No. Even though the processes being	Automated software updates initiated from

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					tested, they will be implemented in each necessary channel by appropriate technical personnel. Once the physical systems have been installed, software updates are often implemented from a central location.	based on the specific setting. Therefore the activity will involve subjective input from personnel with the necessary skills.	implemented may be automated, the process of installing them is manual. Any future software changes can be made by automated updates.	a central location will replace the need for the manual change on each workstation, saving significant time. This system is already in place in most major banks as networked systems are in use.
13	165	Make channels available for transaction requests	161, 164, 244	168	The appropriate systems and training are provided to each channel to allow for the undertaking of transaction requests.	No. Each channel, specifically branches, may require bespoke settings to ensure they are accessible in the immediate environment.	No. Analysis and physical co-ordination of resources is required.	N/A
13	166	Monitor that the processes for completing transactions are appropriate to legislation and customer needs	161, 164	167	Situational testing is employed to determine the suitability of systems before they are opened for public use. Compliance teams also randomly review transaction requests after implementation to ensure the appropriate processes are in place.	Yes. Testing and compliance checking is done by assessing the appropriateness of the system for each transaction against defined rules.	Yes. Automated testing can be implemented to assess the transaction systems before implementation. Future compliance checking can also be automated.	Automated testing can comprehensively check each feature for reliability in a faster time while using many fewer resources [48].
13	167	Take control action to ensure to ensure the appropriateness of transaction processes	166	-	Any problems identified in the testing phase or post-implementation are analysed and fixed by the operations teams or relevant technical personnel as soon as	No. Any problems will not have been identified previously and therefore there will not be a fixed solution that can be implemented.	No. Problems will require individual analysis and amendment of the transaction systems to ensure suitability.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					possible to ensure the systems are appropriate.			
13	168	Receive transaction requests from customers and internal departments	165	169	All channels (e.g. online, telephone, branch) initiate transaction systems for requests. Online transactions are automated, apart from certain high value transactions that will be flagged for review. Branch and telephone services employ advisors to receive requests.	Yes. The activity will take place almost continuously across all channels.	Yes. Online banking facilities, ATM's and Automated deposit machines already offer automated services.	Banks employ thousands of customer advisors to operate counter services to receive transactions. Automated machines are becoming more widely used and some banks, such as HSBC, also offer purely self-service branches.
13	169	Assess each individual request and react appropriately	168	170	Automated systems will use algorithms to determine the type of transaction request and the appropriate tasks to complete. Advisors in other channels will manually assess the request and follow the defined transaction procedures.	Yes. The process will involve the determination of the type of transaction and then the undertaking of the necessary tasks in the correct order.	Yes. Automated systems used online and in branches currently exist and can be used on a wider scope.	Automated systems will reduce the human resource requirements on the business. However, many customers may take a negative view that the automation is removing the 'personal' aspect of the service provided.
13	170	Monitor that the response to a transaction request is appropriate	169	171	Risk officers and compliance teams randomly sample transaction requests to determine they were correctly processed.	Yes. This will involve the checking of actual transactions against predefined rules to identify the level of compliance.	Yes. US bank JP Morgan Chase employ individuals to be responsible for developing automated transaction monitoring systems [49].	An automated system would allow for the vast majority of transactions to be checked for compliance, rather than the sampling system that is used in the manual process.

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13	171	Take control action to ensure appropriate responses to transaction requests	170	-	Problems identified by risk officers and compliance teams are described to the appropriate personnel and their manager, if required, to highlight mistakes to ensure they are not made again.	Yes. Depending on the problem, automated messages can be sent to the relevant personnel advising them of the mistake and any follow-up action required.	Yes. If it was human error, an automated system could output a standard message to the relevant person and schedule follow-up checking. However if the problem was system-based, manual amendment of the process would likely be required.	The relevant person will be notified of their mistake far quicker than if a manual process was in place and this will allow them to alter the way they operate to ensure further mistakes are eliminated.
14	172	Identify existing relationships with customers based on product holdings	152	173	Banks employ intelligence software to identify all products that a customer holds. The system that Lloyds use is called Customer Insight (CIns)	Yes. The activity involves checking each product area to identify customer holdings to create an overall profile for that customer.	Yes. Automated systems are already in place to achieve this.	Automation is essential for today's banks to remain competitive, gather suitable levels of customer information and considering the amount of customers dealt with.
14	173	Decide how to maintain and develop the existing customer relationships	172	175, 178	Management will develop suitable strategies to identify sets of customers and determine how to develop the existing relationships through new products or customer satisfaction.	No. New strategies are continuously developed in order to remain competitive.	No. The strategies for developing customer relationships are the results of careful deliberation and require management input and agreement.	N/A
14	174	Define an 'offer'	-	175	Management or appropriate personnel of each product area will identify suitable offers to	No. Banks continuously aim to be innovative businesses and therefore the activity requires	No. The creation and development of offers cannot be automated if banks wish to be seen as	N/A

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					use that are not generally available to all customers.	input from relevant personnel to achieve this.	innovative	
14	175	Identify a range of suitable offers	173, 174	176, 178	Appropriate personnel from each product area will continuously aim to develop customer relationships by creating suitable offers ready for use.	No. Each offer requires some element of creative thinking.	No. In order to remain competitive and be innovative, appropriately skilled personnel are required to develop suitable offers that will develop customer relationships.	N/A
14	176	Monitor that the range of offers is suitable to develop customer relationships	175	177	Each offer will be reviewed by management before deployment and in regular performance reviews post-deployment.	No. Many of the offers will require some subjective analysis to determine effectiveness before the offer is deployed.	To some extent. The monitoring of offers before deployment requires subjective analysis but the performance reviews post-deployment can assess each offer in comparison with defined targets.	Automated monitoring can identify poor performance quickly to ensure that suitable alternatives can be implemented before too much damage is caused to the business.
14	177	Take control action to ensure the range of offers facilitates the development of existing customer relationships	176	-	The offers in each product area will be reviewed by management or appropriate personnel to identify suitable changes or new offers to ensure they facilitate the development of customer relationships.	No. Appropriate solutions will not be pre-defined and will have to be achieved through analysis and discussion.	No.	N/A
14	178	Determine how to identify potential personalised offers for existing customers	173, 175	179	Relevant decision-makers will define the determination method,	No. Aside from alterations to the systems used, this	No.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					which may be an automated system.	activity will rarely take place and will require management input to decide on the selected method(s).		
14	179	Identify personalised offers for existing customers	178	180, 181, 183	This system is automated in most major banks and uses parameters for each offer, which are checked against the customer database for suitable candidates.	Yes. This process is continuous and checks for new developments in customer situations and needs in order to identify suitable offers.	Yes. The system is already automated in major banks and the offers are then distributed via a number of channels.	Automation ensures that each customer profile can be checked for potential offers in order to try to maximise the development of relationships.
14	180	Decide how to distribute personalised offers to customers	179	181	This is a management decision with the result being how the offers will be delivered to customers. Cost and customers reached will be major factors.	Yes. Depending on the type of offer and the amount of customers the offer is being sent to, there are only a limited number of ways to achieve this.	Yes. A suitable automated decision-making system could determine the optimum method of distribution by assessing the relevant factors.	There are no significant benefits to automation and the decision to make is relatively simple and quick as it currently is.
14	181	Distribute personalised offers to customers	179, 180	184	This activity is partly automated in banks today. The interviews determined that offers delivered by post are the result of an automated system, while offers are also highlighted to advisors when interacting with customers in branch and via the telephone. Offers are also distributed to customers through	Yes. Depending on the chosen method of distribution, there will be a fairly standard procedure to follow.	To some extent. The most successful method is outbound calling by trained advisors but this is manual. The activity could be fully automated by providing the offers to customers by post, online or on counter receipts for example.	Fully automating the activity would remove the manual outbound calling activity, which is the most successful method of attracting customers to develop their relationship. However, automation does allow a much wider range of customers to be targeted in a shorter space of time.

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					manual outbound calling activities.			
14	182	Define satisfaction with respect to customer experience of the organisation	-	183	Management will have targets of the desired service to provide to customers to deliver satisfaction.	No. Different management may have alternative views on the definition of satisfaction and it will also differ from one channel to the next.	No.	N/A
14	183	Determine whether excellent service and personalised offers lead to customer satisfaction	179, 182	184	Management will decide on appropriates ways to identify this. In Lloyds, this is monitored by a system called Net Promoter Score (NPS), which involves employees calling up customers who have recently used the branch and getting them to rate the service on several factors.	The process will involve the collection of customer feedback in one way or another, and could be achieved by undertaking customer exit chats or the distribution of automated online questionnaires.	It would be possible to automate the system using the provision of online questionnaires.	Automation of the collection of customer feedback to determine satisfaction may mean that qualitative feedback cannot be assessed, limiting the scope of the activity.
14	184	Monitor that the service and personalised offers provided results in customer satisfaction	181, 183	185	Management will regularly review the results of customer feedback to determine whether the service and offers provided are appropriate.	Yes. Each area of the service and offers provided will be assessed for its contribution to overall customer satisfaction.	Quantitative factors can be assessed using an automated system but qualitative customer feedback will require individual assessment by relevant personnel.	Automation may mean that subjective customer feedback cannot be used to determine the level of customer satisfaction. It would however reduce the significant human resources required to manually collect customer feedback.

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14	185	Take control action to ensure service and offers provided lead to customer satisfaction	184	-	Appropriate management personnel will identify factors that require attention and determine the required action.	No. As the problem will be new, no defined solution will exist.	No. Management input is required to highlight the necessary action to rectify the problem.	N/A
15	186	Decide how to monitor income and costs of operations	107	187	Appropriate personnel will analyse the current systems in place and identify how financial information will be monitored.	No. The decision will only be required once and will need an assessment of the processes that each business function uses.	No. The resulting method of monitoring financial information may be automated but the determination method will require human input.	N/A
15	187	Record income and costs of the business	119, 186	188, 190, 323	Most major banks will use automated systems to collect financial data on a daily basis, ready for reporting and review. Some external data, such as credit card income, is provided by the related companies each day. Dedicated accounting teams will be employed to put the relevant data into a readable format.	Yes. The activities required will be consistent and undertaken daily.	Yes. Automated systems are in place to record the majority of internal data, while any additional information is included by the relevant personnel.	Finance departments employ a large number of people and automation may reduce this need. Some human input will always be required for costs and income of systems that cannot be automatically monitored or come from external sources.
15	188	Monitor that total income at least covers the costs of operations	187	189	Accounting departments or teams will assemble financial documents for each business function to determine whether it is profitable.	Yes. This will involve the collection of all appropriate data and determining if total income is greater than total costs.	No. The activity is unlikely to be able to be fully automated due to the size of a major bank. Unforeseen costs and income are a regular occurrence in businesses such as this and not all	Automation would limit the scope of the financial recording and produce potentially inaccurate results. Once reports are produced, identifying that total income

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							of these can be automatically monitored. They would require some manual input into the accounts	covers total costs is a fairly simple activity, but the root cause may require further analysis.
15	189	Take control action to ensure the income of the business at least covers the cost of operations	188	-	Upper management will be notified of the situation and determine the necessary action to take to ensure profitability. The department will then likely receive additional focus until the situation is resolved.	No. The problem will have major significance on the financial stability of the organisation and will require substantial analysis and management input. Pre-defined solutions are also unlikely.	No.	N/A
15	190	Identify any appropriate changes to the financial targets of products	187, 349	191	Appropriate personnel will review financial information for each product area to ascertain if any changes are required to financial targets and what they would be.	Yes. A product performing poorly may need to have its targets reduced for the short-term while good performing products may see targets increased to drive growth.	To some extent. New financial targets can be derived from the statistical analysis of performance data but it may not be able to take some intangible factors into consideration.	Automation may lead to some inflexibility for the consideration of exceptional circumstances. Therefore some manual review of target changes would be desired.
15	191	Monitor that the changes to financial targets are appropriate	190	192	Once decided, appropriate personnel will review the changes before they are implemented, while they will continue to be reviewed on an ongoing basis in regular	Yes. The activity involves the assessment of performance in comparison with financial targets to determine whether the targets are appropriate or need review.	Yes. An algorithm can be defined and implemented to compare performance with targets. Ongoing poor performance may be the result of inappropriate targets.	Performance reviews are often undertaken on a monthly basis and consider all factors of the business. Ongoing poor performance of one area may not be identified for a number

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					performance review meetings.			of months, where an automated system with continuous reviews may highlight these errors earlier.
15	192	Take control action to ensure the new financial targets of products are appropriate	191	-	Appropriate personnel will assess the targets and derive more suitable figures. It is likely that these will then require management sign-off.	Yes. The procedure will follow a set of tasks such as identify any exceptional circumstances to consider and assess historical data to derive more suitable targets.	Yes. The activity could potentially be automated with the use of statistical algorithms to assess historical data and implement a continuous review process until the targets are deemed appropriate.	Unforeseen circumstances may not be programmed into the system and therefore cannot be accounted for. An automated system will allow management to concentrate efforts on other matters.
16	193	Identify activities that constitute providing a service	-	194, 195	Management will identify appropriate activities for each channel.	No. The activity will likely once take place once.	No. Automation is not required.	N/A
16	194	Define excellent with respect to quality of service provided to customers	193	195	Management will define expectations of the organisation and its employees.	No. The activity will not be undertaken often.	No.	N/A
16	195	Identify the desired quality of service provided to customers	193, 194	196	Management will identify what level of service they desire to be provided to customers. This may vary from one channel to the next.	No. The results from the activity can be subjective and vary from one person to the next.	No.	N/A
16	196	Assess the quality of service provided to customers	195	197	In Lloyds, this is achieved by a system called Net Promoter Score (NPS), which involves employees calling up	The process will involve the collection of customer feedback in one way or another, and could be achieved by	It would be possible to automate the system using the provision of online questionnaires.	Automation of the collection of customer feedback to determine satisfaction may mean that qualitative

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					customers who have recently used the branch and getting them to rate the service on several factors. Exit chats are another regular tool used to capture customer feedback while they are still present.	undertaking customer exit chats or the distribution of automated online questionnaires.		feedback cannot be assessed, limiting the scope of the activity.
16	197	Take control action to ensure excellent service is provided to customers	196	-	All customer feedback and complaints received are analysed to identify possible trends. Individual incidents of less than excellent service are dealt with by immediate management.	No. As the problem will be new, no defined solution will exist.	To some extent. The automated monitoring system could send data to the offending member of personnel and allow them to ensure no further mistakes are made. Ongoing trends are unlikely to have pre-defined solutions and will require manual input.	While an automated system can make employees aware of situations that customers were not satisfied, it will be difficult to provide automated appropriate advice for each circumstance.
16	198	Define a query and a complaint	-	199, 201	Appropriate personnel will define what the company perceives as a query and a complaint. Lloyds define a complaint as any situation where the customer 'grumbles'.	No. The definitions will be fairly static and therefore the activity will not take place regularly.	No. Automation is not required.	N/A
16	199	Define timely and satisfactory with respect to the manner in which queries and complaints are resolved	198, 202	205	Appropriate personnel will define suitable company-wide response procedures. Industry	No. The definitions will be fairly static and therefore the activity will not take place regularly.	No. Automation is not required.	N/A

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					regulator, the FSA, imposes legislation on how companies deal with complaints.			
16	200	Make channels available for queries and complaints	244	201	The appropriate systems and training are provided to each channel to allow for the correct processing of queries and complaints.	No. Each channel, specifically branches, may require bespoke settings to ensure they are accessible in the immediate environment.	No. Analysis and physical co-ordination of resources is required.	N/A
16	201	Determine whether the customer request is a query or a complaint	198, 200	203, 204	Suitably trained personnel will determine this at first point of contact.	Yes. This determination will be a regular activity and requires the assessment of certain factors to ascertain whether it is a query or complaint.	No. Some subjective analysis is required of each individual situation.	N/A
16	202	Identify FSA legislation relating to complaint handling	346	199, 203, 205, 207	Legal and compliance teams will identify relevant legislation and any recent amendments.	Yes. This will involve the collection of all regulation relevant to complaint handling into a single repository.	While this activity could possibly be automated, it would not take place often and the activity may be more effectively done by skilled legal and compliance teams.	The rarity of the activity means that automation may not be cost effective.
16	203	Decide how respond to a complaint	201, 202, 204	205	Depending on certain FSA regulations, appropriate personnel will determine how complaints should be dealt with. This will later be developed into a complaints handling procedure.	No. The activity will require the analysis of a multitude of possible complaints. Once determined, the activity will not take place again in the short term.	No.	N/A
16	204	Decide how to identify the	201	203	Appropriate personnel	No. The activity will	No.	N/A

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		level of complaint			will identify certain factors for complaints that mean it will require more authorized employees to deal with it.	require the analysis of a multitude of possible complaints. Once determined, the activity will not take place again in the short term.		
16	205	Develop complaint handling process to be used when dealing with a complaint	199, 202, 203	206, 207, 209, 210	Appropriate personnel will devise suitable procedures based on regulations and what upper management expect from complaint handling [50].	No. The activity will require skilled input to derive a suitable procedure. Once done, the procedure will likely stay fairly static for some time.	No. Skilled input is necessary.	N/A
16	206	Allocate appropriate personnel to respond to varying levels of queries and complaints	205, 209	210	FSA regulations state that overall responsibility for complaints should be allocated to a senior individual [51]. Training and responsibility also given to certain individuals in branches for more routine complaints.	Yes. Individuals with the required training and experience will be allocated the defined roles for complaint handling.	Yes. As long as the system is provided with the skills and knowledge of employees, automated allocation of complaint handling would be possible.	The process of allocating the role to individuals is fairly simple and does not occur often, therefore automation may not be cost-effective for the business.
16	207	Monitor that the complaint handling process is compliant with the relevant legislation	202, 205	208	Risk and compliance teams, along with auditors, will monitor that the procedure is compliant with all regulation.	Yes. This will involve the checking of the procedure for compliance with regulation. Any identified issues may require manual action.	Yes. Automated compliance systems are commonplace in organisations.	The system will ensure the process is compliant by checking it against certain rules. However, the activity will not be required often and therefore may not be cost-effective.
16	208	Take control action to	207	-	Individuals responsible	No. The problem is	No. The activity will	N/A

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		ensure complaint handling procedure is compliant with legislation			for developing the complaint handling process will review the identified problems and amend the procedure as appropriate.	unlikely to have any pre-defined solutions as it will be previously unknown.	require specialist input.	
16	209	Ensure relevant employees are aware of necessary processes to undertake when dealing with queries and complaints from customers	205	206	Regular reviews of the complaint handling process are undertaken by immediate management to ensure that knowledge of the process is up-to-date.	Yes. The activity involves asking the particular individual about their knowledge of the process. If answered satisfactorily, the individual can then continue in their role. If not, additional training may be required.	Yes. An automated questionnaire can be sent out to all appropriate personnel to assess their knowledge of the process.	Automation will ensure that regular reviews are taking place, while also relieving management of the need to undertake the activity. The same questions can be asked with the possibility of multiple choice answers to ensure the system is just as efficient.
16	210	Process customer queries and complaints as and when received	201, 205, 206	211	Advisors are readily on hand at appropriate channels to process queries and complaints.	Yes. The majority of queries and complaints will follow pre-defined procedures to complete correctly. A small minority of these may require further analysis and advice.	To some extent. Simple queries such as the creation or deletion of standing orders are already automated on the online systems. However, many queries and complaints will require some thought by advisors over the best course of action.	Automation of the more simple queries is possibly the next logical step of automation in branches. However, it will not be possible to automate many query and complaint processes while customers may also desire that the bank retains some elements of face to face service.
16	211	Monitor that the manner in	210	212	Most complaints	No. While each	To some extent.	Most standard

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		which queries and complaints are handled meets the needs of the bank's customers			undergo checking from customer relations teams to ensure that the correct outcome was derived. Customer feedback is also gathered on a continual basis to identify whether all needs were catered for.	individual complaint is checked for correctness, similar complaints may have different circumstances. Therefore some subjective analysis is required to determine the right result for that particular customer.	Automation can be implemented to check whether the process followed for each complaint is correct but checking whether the result is the right one for that particular customer requires a skilled assessment.	complaints and queries can be checked by an automated system to see if they comply with fixed rules, but some will always require some subjective analysis for that individual situation.
16	212	Take control action to ensure to ensure that queries and complaints are dealt with in such a way as to meet the needs of the banks customers	211	-	Any situations where the procedure was not followed correctly will be identified to management who will aim to rectify the problem with the related individual to ensure customer needs are fulfilled in the future.	No. The problem may depend of the skills of the employee, which therefore need to be reassessed, or the actions taken in an individual situation, where no pre-defined solution would exist.	No. An assessment of the individual situation is required.	N/A
17	213	Determine the human resource requirements of the organisation	-	215	Management in each department will identify the human resource requirements to allow all activities to be efficiently completed.	No. This decision is often the result of management consideration of the needs of a department.	No.	N/A
17	214	Identify the human resources currently available	219, 220	215, 223	Many major banks will use automated human resource systems to track the status and progress of each employee.	Yes. This involves the identification of what human resources are currently employed.	Automated human resource management systems (HRMS) are already in place in many major organisations to deal with activities such as payroll, training and recruitment [52].	An automated HRMS can lead to cost savings, reduced errors and greater accuracy of employee information [53].

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
17	215	Assess the capabilities of available human resources	213, 214, 222	216, 227	Immediate management will assess the capabilities of existing employees to determine their suitability for current and future roles.	Yes. Each individual will be assessed in accordance with a number of factors to determine overall capabilities.	To some extent. Automated training and testing can identify the current capability for certain tasks and while the activity will follow a set procedure, each person will be also be assessed on a number of intangible factors.	N/A
17	216	Determine whether the capabilities of available human resources match the requirements of all activities	215	218	Each role will have specific requirements and the capability assessment will be used by management to determine suitability.	Yes. The activity will involve a simple comparison of capabilities with requirements to determine suitability.	Yes. An algorithm can be defined to compare two sets of data to determine an outcome.	Determining whether assessed capabilities match defined requirements is a simple and quick activity and may not be cost-effective to automate.
17	217	Define appropriate with respect to personnel decisions	-	218	Senior management and human resource departments will determine a suitable approach to make regarding personnel. Relevant employment laws may also influence this definition.	No. The activity will only likely take place once and requires input from management.	No.	N/A
17	218	Decide whether to acquire, develop or dispose of personnel	216, 217	219, 220, 222	Appropriate management will determine which route to take with personnel decisions.	Yes. Depending of the human resources available and their capabilities, appropriate decisions will be made.	Yes. The activity could potentially be automated as decisions are made based on identified factors.	Given the nature of the decision and the potential costs of employment or termination, the decision should possibly be made by

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
								management after careful consideration.
17	219	Acquire personnel	218	214	Once requirements are identified, human resource departments will advertise the position internally and externally for interested parties and recruit the required resources from the suitable applicants.	To some extent. The process of coordinating job advertisements and matching criteria with automation are examples of PD. However, the final decision of which applicant to hire will be the result of careful management consideration.	To some extent. Programs dealing with recruitment are used in today's organisations to locate, attract and coordinate the hiring of employees [52]. The actual decision of which candidate to hire will still be a manual decision made by management.	The process becomes much more simplified with an automated system and can link with recruitment sites and match applicant criteria with the requirements to determine suitability.
17	220	Dispose of personnel	218	214	Each company will have an employment policy which is based on relevant legislation. Management will follow this policy when needing to dispose of personnel.	No. Each employee must be treated individually and fairly, taking all factors into consideration. This may require subjective analysis by management.	No. Each case must be treated individually, meaning the use of pre-defined algorithms and solutions is not possible.	N/A
17	221	Decide how to develop existing personnel	-	222	Appropriate management will determine suitable methods of developing existing personnel.	No. The activity will involve the analysis of possible methods. Once the decision is made, it will likely have lasting relevance.	No. Management discussion is required.	N/A
17	222	Develop existing human resources to achieve the required capabilities	218, 221	215	Banks employ physical training schemes in collaboration with online training and learning systems.	Yes. Depending on the capabilities required, suitable training schemes will be undertaken. My experience has also	Yes. Automated learning management systems (LMS) are used for the administration, tracking and reporting of training content [54].	An automated learning management cannot deal with situations requiring performance support or informal learning. Therefore its

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
						shown that some training is valid for limited periods and therefore needs renewing before the deadline expires.		scope is somewhat limited.
17	223	Define an individual's potential with respect to their employment and capabilities	214	224	Management will review the potential of an employee during regular performance reviews.	Yes. An individual's performance in a particular area such as sales may identify their potential for progression.	Yes. HRMS can use performance review information to track an individual's talent and employment potential [52].	With the number of employees that a major bank has, automatically identifying the potential of one employee will save a lot of management time during reviews.
17	224	Monitor that the personnel development process allows individuals to realise their potential	223	225	This activity is mainly undertaken by management in each department. However, if a role is not currently available, an individual may be unable to progress.	Yes. By identifying each employee's potential, it will be possible to identify the ratio of those who do achieve their potential.	Yes. HRMS can track the progress and potential of each employee and produce reports that can be used by management.	Manual operation of this process would take significant time in major banks due to the number of employees.
17	225	Take control action to ensure that the organisation allows individuals to realise their full potential	224	-	When action is required, management will determine appropriate action to take.	No. The problem will likely be unforeseen and therefore no existing solution will be available.	No. Management input will be required to amend the development process.	N/A
17	226	Identify roles for each activity	235	227	Activities in each department will have roles defined by immediate management. More generic roles may be defined by higher levels	No. The activity will only take place once unless new activities are necessary.	No. Automation is not required as the activity will not occur regularly.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					of management.			
17	227	Allocate activities to the appropriate personnel	215, 226	228	Generic roles such as Banking Advisor or Customer Advisor will have specific roles that will only require definition once. Less general roles and project work may require more input for allocation.	Yes. Each role will have specific requirements and can be allocated to appropriate and available personnel.	To some extent. Some small and general activities can be automatically allocated to employees by checking their availability and capabilities. However, larger or more complex activities may require some knowledgeable insight.	Automating the allocation of small and simple tasks will reduce some of the burden on managers and other decision-makers.
17	228	Monitor conformance of human resource capabilities with the activity requirements	227	229	All employees are subject to performance review by management where their skills for the role are assessed.	To some extent. Some factors may be numerical, such as sales data, but others are subjective and require physical assessment.	To some extent. While employees can monitor their own performance by using automated tools, the final judgement is made by management, especially surrounding intangible factors.	Automated systems can monitor the capabilities of employees with quantitative data, but will not be able to consider qualitative data.
17	229	Take control action to ensure the capabilities of available human resources are a match for the requirements of activities	228	-	Management will identify the areas that need development and schedule the necessary training or knowledge capture required.	Yes. If it is determined that an employee is lacking a particular capability, training to address the problem can be automatically scheduled.	Yes. Upon identification of a training need, HRMS can schedule the necessary training.	An automated system will identify and schedule the necessary training quickly. A manual process may experience delays as the performance of all employees is reviewed.
17	230	Determine the needs of individuals	-	232, 233	The Board and management will determine employee requirements following	No. The needs will only need definition once, unless problems are later identified.	No. Automation is not required.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					relevant analysis, some of which will be based on appropriate legislation.			
17	231	Define appropriate business needs for employees	-	232, 233	The Board and management will determine the needs of the business for employees, such as working hours and job requirements.	No. The needs will only need definition once, unless problems are later identified.	No. Automation is not required.	N/A
17	232	Decide when to balance individual and business needs	230, 231	233	Appropriate personnel will define the working conditions and requirements of employees, to be included in employee contracts.	No. The activity will require assessment of the needs for different roles. Once defined, the activity may not be required again.	No.	N/A
17	233	Monitor 'balance' of individual and business needs	230, 231, 232	234	Automatic monitoring of internet use and attendance is already in place in major banks, while management will tend to be responsible for monitoring other factors and gaining employee feedback.	PDs are included in the monitoring of internet use and attendance but other factors will require some manual analysis.	To some extent. Automated monitoring of some aspects of needs is possible but others will still require manual analysis.	Automated monitoring leads to reduced employee privacy and therefore job satisfaction. However, it is able to identify those employees who do not pull their weight.
17	234	Take control action to ensure an appropriate balance of individual and business needs	233	-	Appropriate management will assess the needs of individuals and the business to derive a more suitable balance.	No. Since the problem will be new to the business, no fixed solution will exist.	No.	N/A
17	235	Decide how to do each	Act	226,	Appropriate decision-	No. Once defined, the	No. A manual	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		activity	Info	244	makers and operations teams will analyse each activity and identify relevant procedures and requirements for each to be completed effectively.	requirements of an activity will be fairly static unless the activity itself changes.	assessment of the individual activity is required and requirements may changes from one location to the next.	
18	236	Determine physical resources required by the organisation	-	238	Management in each department will identify the physical resource requirements to allow all activities to be efficiently completed.	No. This decision is often the result of management consideration of the needs of a department.	No.	N/A
18	237	Identify physical resources currently available	242, 243	238, 248	The organisation will keep a record of all physical assets that the organisation owns.	Yes. This involves the identification of the physical resources of the organisation.	No. If the list of resources is kept in a database, it is easily query-able by appropriate employees, but will require physical compiling.	N/A
18	238	Assess the capabilities of the available physical resources	236, 237, 270	239	Management or resource owners will assess the capabilities of each resource.	Yes. The activity will involve the assessment of each resource against certain criteria.	No. The activity will involve the assessment of physical items and therefore a computer program cannot be used to do this.	N/A
18	239	Determine whether the capabilities of available physical resources match the requirements of all activities	238	240	Each activity will have specific requirements and the capability assessment will be used by management to determine suitability of resources.	Yes. The activity will involve a simple comparison of capabilities with requirements to determine suitability.	Yes. An algorithm can be defined to compare two sets of data to determine an outcome.	Determining whether assessed capabilities match defined requirements is a simple and quick activity and may not be cost-effective to automate.

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
18	240	Decide whether to acquire or dispose of physical resources	239	241, 243	Appropriate management will determine which route to take with physical resource decisions.	Yes. Depending on the physical resources available and their capabilities, appropriate decisions will be made.	Yes. The activity could potentially be automated as decisions are made based on identified factors.	These decisions often result in high expense for the organisation and therefore should be reviewed by management.
18	241	Define physical resources to acquire	240	242	Depending on the capabilities required, appropriate personnel will identify which resources will be acquired.	Yes. If all possible resources to acquire are known, the desired capabilities will determine which resource will be chosen.	To some extent. As long as all possible resources and requirements can be defined, an algorithm can identify the optimum solution.	The selection of high-value resources for acquisition will still require some management input for authorisation.
18	242	Acquire physical resources	241	237	Depending on the type of resource required and how often an order is placed, automated ordering may be used. For higher value or non-regular purchases, the role will be allocated to authorised personnel.	Yes. As long as the purchaser or purchasing system is aware of the resources required and the quantity, orders can be placed when needed.	Yes. Enterprise resource planning (ERP) systems offer supply chain management services that may include automated purchasing facilities [55]. This will only be for regular, low value resource purchases.	Automation of purchasing for small but regular purchases can create a direct link with suppliers for faster ordering and easy recording of purchase history.
18	243	Dispose of physical resources	240	237	Depending on the size of the resource, the role will be allocated to specific individuals. Banks generally outsource the management of some physical resources, such as computers, or employ internal teams to deal with the task.	Yes. Each identified resources should have specific guidelines to follow for disposal, such as ensuring the security of data.	No. The activity deals with physical items and will require some manual input.	N/A
18	244	Allocate physical resources	235,	165,	Company-wide resource	Yes. Each activity will	To some extent. Many	The task of manually

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		to support activities	238	200, 245	allocation is often an activity done by upper management but each department may deal with the allocation of its own resources too.	have specific requirements and the appropriate resources can be allocated.	available resources can be allocated based on the capability assessment and requirements but larger resources may require complex coordination.	allocating resources to an activity requires significant input, so automation will reduce the workload of the appropriate personnel. This may also reduce the human resources required and therefore lower costs.
18	245	Monitor that the capabilities of the physical resources match the requirements of the activities	244	246	This is an activity that is not often undertaken in banks and is more often the result of an identified problem.	No. The activity will involve the assessment of an individual physical item.	No. Manual assessment of a physical item is required.	N/A
18	246	Take control action to ensure the capabilities of available physical resources are a match for the requirements of activities	245	-	Management will identify the resources that no longer satisfy criteria and make suitable decisions to ensure compatibility.	No.	No.	N/A
18	247	Define quality standards for physical resources	-	248	Appropriate management will determine the required standards of resources, partially based on relevant legislation.	No. Once undertaken, the activity will not be undertaken again soon.	No. Automation is not required.	N/A
18	248	Assess quality standards	237, 247	249	Suitably skilled personnel will assess each resource individually to determine quality standards.	Yes. The activity will involve the comparison of resource characteristics to the defined quality factors.	No. The assessment of physical resources cannot be automated as human input is necessary.	N/A
18	249	Monitor that quality standards of physical	248	250	The activity will be undertaken at the end of	Yes. The activity will involve the comparison	Yes. The assessment results can be fed into an	The activity could take place at the same time

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		resources meet the standards required			the quality assessment by the same personnel.	of actual quality standards against desired levels to determine if any control action is required.	automated system with the output determining if resources still comply with standards.	as the manual assessment, meaning automation of this activity does not bring many added benefits.
18	250	Take control action to ensure physical resources are of the required quality	249	-	Resource management will identify the problems and make appropriate decisions to ensure resources are of the desired quality.	Yes. Depending on the resources and the identified problem, a standard response may be used.	To some extent. The decision of how to ensure the quality of the resource can be automated as it can follow a set procedure, but the actual activity of improving quality of a physical resource will have to be manual.	Automation of the decision-making process can ensure consistency across the whole business and remove unnecessary costs.
19	251	Identify the communication needs of the business and customers	69, 99	252	Management and analysts will assess market intelligence and internal factors to identify communication needs.	No. The activity will not be undertaken often and will require analysis of customer feedback and the organisation structure.	No.	N/A
19	252	Determine communication requirements	251, 253	255	The Board and departmental management will identify the communication requirements for the whole organisation in order to meet needs.	No. This decision is often the result of management consideration and will not be undertaken again unless the business or needs change significantly.	No.	N/A
19	253	Define geographic spread of the organisation	-	252	The Board would identify the physical scope of the organisation in order to determine the company-wide communication	No. The activity will not be a regular occurrence.	No.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					resources.			
19	254	Identify communication resources available	-	255	Appropriate management will identify the resources currently available for the whole organisation and individual departments.	No. The activity will involve a physical identification of resources.	No.	N/A
19	255	Assess the current communication capability of the business	252, 254	256, 258	Management or resource owners will assess the capabilities of each resource to determine the communication capability of the business.	Yes. The activity will involve the assessment of each resource against certain criteria.	No. The activity will involve the assessment of physical items and therefore a computer program cannot be used to do this.	N/A
19	256	Monitor that the capability of communication resources match the requirements of all activities	255	257	Allocated personnel will compare the capability with requirements after an assessment or on a periodic basis determined by company policy.	Yes. A comparison algorithm can compare two sets of data to identify an outcome.	Yes. As long the required data is fed into a system, the actual activity of monitoring conformance can be automated.	The activity will usually be undertaken along with the assessment of the capability. Therefore there is a possibility that automation would not bring added value and is not required.
19	257	Take control action to ensure that the capabilities of communication resources meet the requirements of all activities	256	-	Upon determining non-conformance, suitably skilled personnel will suggest appropriate action for management to authorise.	As long as the problems and solutions can be well-defined, a decision algorithm can be programmed.	Yes. The decision-making process can be automated but the act of ensuring physical communication resources meet requirements will need manual input.	Automation of the decision-making process can ensure consistency across the whole business and remove unnecessary costs.
19	258	Allocate communication	255,	260	Company-wide resource	Yes. Each activity will	To some extent. Many	The task of manually

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		resources to relevant activities	261		allocation is often an activity done by upper management but each department may deal with the allocation of its own resources too.	have specific requirements and the appropriate resources can be allocated.	available resources can be allocated based on the capability assessment and requirements but larger resources may require complex coordination.	allocating resources to activity requires significant input, so automation will reduce the workload of the appropriate personnel. This may also reduce the human resources required and therefore lower costs.
19	259	Determine the type of information required by all parties	-	261, 262	Business and systems analysts are employed to determine the information requirements of the business through the undertaking of data and procedure analysis and market intelligence [56].	No. The activity will require some analysis of customer and employee feedback to derive a list of requirements.	The activity of gathering the necessary information can be automated through the use of questionnaires for example, but the analysis of the collected data to derive requirements will need to be undertaken by a suitably skilled individual or team.	Automation of the information gathering task will save significant time as this research section is often the most time-consuming.
19	260	Identify available channels of communication	258	262	An operations team will be responsible for controlling the communication channels of the business.	No. Without a change in business operations, the channels will be fixed and therefore the activity will not be required again.	No.	N/A
19	261	Define securely and timely with respect to sending of information through available channels	259	258, 262	The Board and appropriate management will define the expectations of the business and its internal and external	No. The activity will require the opinion of senior management and will only be undertaken once.	No.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					communications, possibly in a company policy.			
19	262	Determine how to assess the satisfaction of all parties using the information sent using communication resources	259, 260, 261	263	Management in each department will determine a suitable approach to assessing customer and employee satisfaction. Senior management may decide to supplement this with a company-wide method also.	No. The activity will involve the analysis of several possible methods to determine the best decision.	No. The resulting system may be automated but the activity of choosing an appropriate method will rarely take place and requires management decisions.	N/A
19	263	Monitor that the availability and capability of communication resources is sufficient enough to satisfy the relevant individuals	262	264	Banks regularly undertake employee feedback gathering activities, such as surveys, while customer feedback is continuously gathered and used for multiple purposes, including this.	Yes. Algorithms can be defined to gather appropriate information while as long as the data is quantitative it can be statistically analysed to determine if any problems exist.	Yes.	Automation can collect and analyse numerical data but does not consider qualitative data and subjective feedback.
19	264	Take control action to ensure that the communication resources satisfy the needs of the relevant individuals	263	-	Appropriate management will analyse available information to make an informed decision to ensure the satisfaction of all parties.	No. There will be no pre-defined solution for this problem.	No. The problem will need to be analysed to determine what possible action is required.	N/A
20	265	Know about developments in related technology	-	266	Banks employ dedicated IT and technology departments that will know about technological	No. The developments will not have been known before and could become public knowledge in any way.	No. The activity will require manual input as the developments can be made public in any fashion.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					developments.			
20	266	Identify relevant technological developments	265	267, 341	The IT and technology departments will identify developments that may be relevant to the organisation.	No. Developments will have to be assessed individually for their potential relevance to the banking organisation.	No. Each development will be new and therefore will require knowledgeable insight from skilled personnel.	N/A
20	267	Decide to exploit new technology	266	268	IT and technology teams will create reports on relevant developments, ready for management to make an informed decision.	No. Each development will be new to the industry and therefore no defined decisions will exist.	No. Each report will need reviewing on its own merits to allow management to determine its appropriateness.	N/A
20	268	Determine how to exploit and implement technological developments	267	270	Suitably skilled technical teams will assess the new technology and existing systems to determine how it can be best implemented.	No. The technology will be new and each existing system will require analysis. Therefore no existing solutions will exist.	No. Expert knowledge of the activity is required.	N/A
20	269	Define continual development	-	270	Appropriate personnel will define a technology plan or policy in many major organisations which outlines the expectations.	No. The activity is strategic in nature and will only take place once.	No.	N/A
20	270	Continually develop physical resources by exploiting relevant technological developments	268, 269	238, 271, 273	IT and technology teams will regularly exploit identified technology to improve the business in order to remain competitive.	No. Each technology will be new and have a different impact on the organisation. Therefore no existing solution will exist.	No. While technological developments often result in automated systems, the physical activity of implementing the new technology requires skilled personnel.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
20	271	Monitor that the exploitation of technological developments is resulting in continual development of physical resources	270	272	Each new development will be subject to an introductory period and performance reviews by skilled personnel and management.	No. Some systems may produce qualitative output that can be assessed for improvement but other technology will bring intangible benefits that require individual analysis.	No. Input is required from skilled personnel to assess the results of new technology.	N/A
20	272	Take control action to ensure that the exploitation of new technology is resulting in the continual development of physical resources	271	-	Management will review the technology plan or policy and make the required changes to ensure the approach results in continual development.	No. The problem will be previously unknown and therefore no defined solution will exist.	No. Manual input is required.	N/A
20	273	Monitor that the continual development of physical resources is resulting in improvements in the identified performance areas and maintained competitiveness of the business	33, 270	274	Regular performance reviews are undertaken for all aspects of a bank, which will include the review of the impact that new technological developments has made.	To some extent. Some of the developments can be measured numerically meaning identification of increased performance is possible. However other developments provide intangible benefits that require subjective analysis.	It is possible to automate the performance review of some systems but new developments providing intangible benefits and the determination of competitiveness will require a physical assessment of the system and the business.	While automating part of the system is possible, the fact that some of the activity will still require manual input means that the effort of automation may not be cost-effective.
20	274	Take control action to ensure that the continual development of physical resources leads to increased performance and maintained competitiveness	273	-	Management will assess the identified problems and make informed decisions regarding future developments, possibly resulting in the alteration of the	No. The problem will be previously unknown and therefore no solution will exist.	No. Management action is required.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					technology plan.			
21	275	Assemble learning from all activities	Learn info	276	Employees can circulate information about lessons learned, while systems are also used allowing employees to enter information that can be accessed by others when required.	No. The lessons learned from an activity will often be the result of subjective analysis.	No. The learning can all be entered into an automated system, but automated collection is not feasible as it is often the result of past actions.	N/A
21	276	Identify the learning that is transferable	275	277, 278	Management will often determine lessons that others will be able to benefit from.	No. Learning may be the result of an unforeseen incident which cannot be developed into an algorithm.	No. The activity will involve some non-programmable information as well as subjective assessment of the situation.	N/A
21	277	Determine who can benefit from the learning	276	280	Immediate management will usually determine individuals that could benefit for learning as their capabilities and knowledge are well-known.	Yes. Each instance of learning may be relevant to an individual or set of employees by identifying related factors.	Yes. As long as certain factors can be derived from each learning instance, an automated system can determine lists of employees who the learning may be relevant to.	Automatic identification of beneficiaries will ensure that every employee is notified about the learning, while it can also track the responses.
21	278	Determine format for transfer	276	279	Management will determine the required format for the learning transfer, whether it be email communication, digital media or inclusion in learning database etc.	No. Each instance of learning may include previously unknown information and a pre-defined decision may not be possible.	No. Each learning instance must be assessed on an individual basis and because new information may be included, automation may not be possible.	N/A
21	279	Transform learning into required format	278	280	Management will usually convert the learning information into the required format for	Once the format is determined and the learning is assembled, an algorithm could be	Yes. As long as the format can be achieved through automation (i.e. not human interaction),	DVD's are routinely watched by employees to improve knowledge and automated

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					employees to use.	defined to complete the conversion.	automation is possible.	transfer into this format will save considerable time as many copies would be required to cover all locations.
21	280	Make learning available	277, 279	281, 289	Repositories of information and learning are available for employees to query when required. Lloyds also employ a system called 'phone-a-friend' where employees can contact a dedicated and knowledgeable team with any work-related issue.	Yes. The learning can be organised into the desired format and made available for employees to query when required.	Yes. Automated systems are currently used which allow for searches by employees. Access to knowledgeable personnel cannot be automated.	It may not be feasible to include appropriate information for all possible queries in an automated system. Therefore some manual processes involving the use of experienced personnel may be desired.
21	281	Monitor use of prior learning	280	282	Once management action has been required, the activity is usually subject to greater focus in the short term to ensure that previous mistakes have been eliminated.	Yes. The activity will follow a set procedure of identifying the activity and its recent performance and assessment if the learning has been understood.	No. While automated systems can monitor performance, some physical analysis is required to determine whether previous learning has been understood and used.	N/A
21	282	Take control action to ensure prior learning is used effectively to improve all relevant aspects of the organisation	281	-	Activities still suffering from poor performance are often the focus of upper management in a bid to determine the root cause and identify action to ensure learning is used effectively to	No. The problem will be new to the business and therefore will not have a solution defined.	No. Upper management input is often required and used to ensure previous mistakes are eliminated.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					improve the system.			
22	283	Determine the level and amount of information required within the knowledge base	-	284	Major banks are often split by business function and each function will have appropriate personnel to determine information requirements.	No. The decision will only be taken once unless problems are identified.	No. Automation is not required.	N/A
22	284	Determine how to maintain the desired level of the knowledge base	283	286	Individuals responsible for the knowledge base will develop procedures to ensure the knowledge base operates at the desired level.	No. The decision will only be taken once unless problems are identified.	No. Automation is not required.	N/A
22	285	Define 'up-to-date' with respect to the information held	-	286	Senior management will have expectations of the information of the organisation and the knowledge base owners will define requirements based on these expectations and relevant information legislation.	No. The decision will only be taken once unless problems are identified.	No. Automation is not required.	N/A
22	286	Identify the information requirements of each business function or activity	Act info, 284, 285	287	Business and systems analysts are employed to determine the information requirements of the business through the undertaking of data and procedure analysis and market intelligence [56].	No. The activity will require some analysis of customer and employee feedback to derive a list of requirements.	The activity of gathering information can be automated through the use of questionnaires for example, but the analysis of the collected data to derive requirements will need to be undertaken by a suitably skilled individual	Automation of the information gathering task will save significant time as this research section is often the most time-consuming.

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
							or team.	
22	287	Decide how to acquire, process and make information available as required	286, 291	288, 290, 292	Individuals responsible for the knowledge base will determine the necessary processes based on the information required and the current systems in place.	No. The activity will involve the analysis of current systems and requires expert knowledge to define the necessary processes.	No. Suitably skilled personnel are required to undertaken this activity.	N/A
22	288	Determine where to acquire information	287	289	Once the information requirements are determined, business and systems analysts will identify the sources of the information.	No. The source of some specific information is subject to change and depends on a number of factors.	No. Business and systems analysts are used to assess current systems to identify information sources.	N/A
22	289	Acquire information for the knowledge base	280, 288	290	Banks implement networked systems that allow all employees to access and contribute to.	No. Much of the information added to the knowledge base will be user-created and requires physical input.	Automated systems exist that allow employees to easily share information with colleagues [57].	The automated knowledge base software allows employees easy access to required information as well as the ability to ask questions for other employees to answer.
22	290	Process information as required	287, 289	292	Automated knowledge base systems currently in use organise the information into appropriate categories, while manual processing of physically inserted data also occurs.	Yes. Each type of information will have a specific process required, which can be identified using a decision-tree algorithm.	Yes. Depending on the type of processing required, automated systems can determine the type of information and undertake the necessary activities to process within the knowledge base.	The knowledge base will hold substantial amounts of data that means total manual operation is not feasible. Automation will ensure processing is done far quicker and more accurately.
22	291	Define appropriateness of	-	287,	Senior management of	No. The activity will	No.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		information availability		292	the organisation and each department will define expectations for information availability, which may then be included in a company policy.	require analysis of owner expectations and will only take place once.		
22	292	Make information available for use	287, 290, 291	293	The organisation as a whole and each department itself will have repositories of information that are readily available for querying by employees. Banks may also supplement physical databases with access to knowledgeable personnel.	Yes. The information can be held in a database with searching facilities possible.	Automated systems are in use which can be searched to find suitable information.	Banks have thousands of employees and having an automated information repository would allow anytime access to the appropriate information. This database can then also be updated from a central location.
22	293	Monitor that the knowledge base is sufficiently supporting business activities	292	294	Employee feedback is routinely gathered, while performance reviews of systems will identify any deficiencies in information.	No. The activity will often require analysis by management.	No.	N/A
22	294	Take control action to ensure the knowledge base is operating as required to support business activities	293	-	The knowledge base owners will identify the problems and management will make appropriate decisions to ensure proper operation.	No. The problem will likely be previously unknown and therefore no pre-defined solution will be available.	No.	N/A
23	295	Identify the core activities of the organisation	Act info	296	Senior management will determine what the core activities of the business	No.	No. Management input is required.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					are to fulfil main services by thinking about what the business does and the main activities of employees [58].			
23	296	Determine the objectives of the core activities	295	297, 300	Senior management will discuss and assess the core activities to determine what the objectives are.	No. Once the objectives are determined, they will remain fairly static. Therefore the activity will not occur regularly.	No. Automation is not required.	N/A
23	297	Identify the necessary support functions to enable the core activities of the business to operate as required	296	298, 299	Dedicated operations teams will determine the necessary processes to allow activities to achieve their objectives.	No. Each objective will require analysis and expert knowledge will derive the necessary processes.	No. Some expert knowledge is required.	N/A
23	298	Determine how to implement the support functions to assist the core activities of the business	297	299	Operations teams with the necessary capabilities will assess the necessary processes to determine how they can be best implemented.	No. Each system will require individual assessment in a specific environment by suitably skilled personnel.	No. The activity requires input from suitably skilled personnel.	N/A
23	299	Implement support functions	297, 298	300, 305, 308, 318	Operations teams will utilise their technical skills to implement the required support functions where appropriate.	No. Each function will require implementation in a specific environment by suitably skilled personnel.	No. The activity requires input from suitably skilled personnel.	N/A
23	300	Monitor that the support functions are sufficiently aiding the operation of the core activities	296, 299	301	The performance of activities is subject to periodic review and it is in these sessions that it can be determined whether they are	No. While the performance of an activity can be monitored by an algorithm, identifying the root cause of a	No. Manual input is required to identify the root cause of good or bad performance of an activity.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					operating effectively.	problem often requires physical analysis.		
23	301	Take control action to ensure the support functions are providing the necessary assistance to the core activities	300	-	Management will highlight the issues to the operations team, who will make the necessary changes to ensure proper function.	No. The problem will likely be previously unknown meaning no pre-defined solution will exist.	No. Manual input is required.	N/A
23	302	Identify relevant stakeholders	-	303	Business analysts perform stakeholder analysis activities.	No. The business will be analysed by skilled individuals.	No.	N/A
23	303	Identify the range of services provided to stakeholders	302	305	Business analysts or relevant management will analyse the whole organisation to identify the range of services provided.	No. Unless the organisation sees significant change, the services provided will be fairly static meaning the activity will not occur regularly.	No.	N/A
23	304	Define what constitutes a consistent and quality service to stakeholders	-	305	The Board and senior management will define service expectations, possibly then included in a company policy document.	No. Once defined, the activity will be undertaken regularly.	No. Automation is not required.	N/A
23	305	Monitor that the undertaking of the support functions is resulting in the business providing a consistent and quality service to stakeholders	303, 304	306	Stakeholder feedback is periodically gathered to determine the quality of service. Root cause analysis can then by undertaken by analysts to determine if the support functions are a factor.	Feedback forms can be distributed and collected using an appropriate algorithm but the root cause analysis requires skilled input.	No.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
23	306	Take control action to ensure support functions facilitate the provision of a consistent and quality service	305	-	Analyst's reports are presented to appropriate management to allow informed decisions to be made. Operations teams may then be required to amend the existing support functions.	No. The problem will likely be previously unknown and therefore no pre-defined solution will exist.	No.	N/A
23	307	Identify relevant policies and legislation	346, 350	308	Legal and compliance teams will identify any legislation relevant to the organisation.	No. Legal teams carefully analyse legislation to determine how relevant it is to the organisation.	No. Suitably skilled personnel are used to identify legislation and policies.	N/A
23	308	Assess the performance of support functions with regards to the conformance with policies and legislation	299, 307	309	Risk and compliance officers routinely check system output for conformance to requirements. Exception handling is also employed in software to identify any pre-defined errors that arise.	Yes. Each aspect of the system can be checked for compliance with requirements.	Yes. Automated testing can be employed to test each aspect of the system for compliance with defined requirements.	Automated testing ensures that the system is thoroughly tested, while also often being more accurate. Manual testing is a lengthy and therefore costly process, so automation may save the business money.
23	309	Take control action to ensure the conformance of support functions with policies and legislation	308	-	Operations teams will often be instructed to amend support functions to ensure conformance. The resulting system will be checked for compliance.	No. The problem will likely be previously unknown and therefore no pre-defined solution will exist.	No.	N/A
24	310	Define how an organisation's reputation can be assessed	-	311, 312	The activity will be undertaken by senior management and will identify an appropriate	No. The activity will involve the assessment of several approaches to determine which is	No. The activity requires the input of senior management and will only likely take place	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					procedure of measuring the reputation of the organisation from the desired point of view [59].	deemed most suitable for the organisation.	once.	
24	311	Determine the desired level of the organisation's reputation	310	313	The Board, senior management and shareholders will have an expectation for the reputation of the organisation.	No. Each relevant party may have their own preconceptions about what the reputation should be. Therefore discussion and agreement is required.	No. The activity requires subjective discussion by management.	N/A
24	312	Assess current reputation	310	313, 318	Using the defined procedure, management or business analysts will assess the reputation of the business. The process may also be outsourced to specialised companies.	This depends on the assessment approach. Reputation based on financial figures or customer base can collect the internal data and from competitors financials reports to assess where the organisation stands.	To some extent. The collection of available data to derive the reputation can be automated but this will lead to a very inflexible system. Public opinion often drives reputation and would require extensive collection analysis.	Automation would lead to an inflexible system where the most meaningful measurements of reputation are not considered, such as public opinion. Assessing the reputation will not be continuously undertaken so therefore it may be beneficial to carry out a more in-depth analysis when required.
24	313	Identify the gap between current and desired reputation	311, 312	314, 315	After the assessment, management will identify any gaps in reputation that need to be addressed.	To some extent. Quantitative reputational factors can easily be assessed for gaps but some factors	To some extent. Automation is possible when applying numerical data but management will want to have input	Since not all aspects of this activity can be automated and it will not take place regularly, there is a

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
						may be intangible and require a manual assessment.	when considering intangible information such as public opinion.	case that automation would not bring any added benefits and would be an unnecessary cost.
24	314	Decide how to reduce gap in reputation	313	315	Management will agree upon the necessary action to take to reduce the gap in reputation. The decisions may affect the way in which the business operates.	No. Depending on the reputational area that needs addressing, bespoke solutions may need to be developed.	No. Manual development of an appropriate solution may be required as it may affect the operations of the organisation.	N/A
24	315	Undertake necessary activities to reduce gap	313, 314	316	Instructions will be passed out to the relevant personnel to implement the identified actions.	No. The solution may not have been pre-defined while it may also have an effect on the way the business operates and not just a single system.	No. Any activities to undertake are likely to require the physical amendment of business operations.	N/A
24	316	Monitor that the undertaking of identified activities is resulting in a reduced gap between current and desired reputation	315	317	The reputation assessment will be undertaken periodically in order to determine that the identified actions are reducing the gap.	To some extent. This will depend on the assessment approach used. An approach using numerical data can compare past and current reputation to ascertain whether the gap is reducing.	To some extent. Automated monitoring of the gap is possible when using numerical data, but manual analysis will be required for qualitative data such as public feedback and opinion.	An automated system will routinely monitor that the gap is being reduced, as long as numerical data is used, relieving management of the responsibility of the task themselves. Any instances of the gap not reducing can be easily highlighted.
24	317	Take control action to ensure the reputation gap is being reduced	316	-	Management will review the processes taken to reduce the gap and come to an agreement on the necessary action.	No. The actions may affect the operations of the entire organisation and therefore will require careful	No.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
						consideration. No pre-defined solutions will exist.		
24	318	Monitor that reputation is being maintained by the undertaking of support functions	299, 312	319	Upon the assessment of the reputation, management may undertake further analysis to identify the root causes of the current level.	No. Monitoring of the reputation using numerical data can be undertaken by an algorithm but identifying the cause will require some in-depth analysis.	No. Some subjective analysis of the root cause is required.	N/A
24	319	Take control action to ensure support functions are helping to maintain the organisation's reputation	318	-	Management will advise the operations team of any necessary action, who will then amend the existing functions.	No. Since the problem will be previously unknown, no pre-defined solution will exist.	No.	N/A
25	320	Identify appropriate reports to produce	-	321, 322	Senior management and relevant legislation will determine the reports that are required to be produced by the business. These reports are used for both internal and external purposes.	No. Some of the reports are the result of management decisions and may not have a prescribed structure.	No. The activity requires manual input as some reports may be required for one-off purposes and others may require different content each time.	N/A
25	321	Define report production process	320	322, 323	Management and reporting teams will develop a suitable procedure for producing the appropriate reports.	No. The activity may involve the development of a new process. Once undertaken, the activity would have long term relevance.	No. Input from suitably skilled personnel is required. The resulting method may be an automated process.	N/A
25	322	Determine necessary information and format for reports	320, 321	323	Management and legislation will often define the required content for a report and	No. Each report will require different content and formats in such a way that one algorithm	No. Each report will require manual input to determine a suitable format to display the	Many reports will require bespoke development and any attempt at automation

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					the responsible personnel will then develop a suitable format to display the information.	would not be sufficient.	identified information.	will reduce the flexibility of this.
25	323	Produce appropriate reports	187, 321, 322	324	Most banks will employ dedicated reporting teams to produce the appropriate reports. However, the bank employee interviews showed that reporting automation was currently in development at Lloyds.	Yes. Much of the reporting process involves the collection of data from sources on a regular basis and inserting this data into report templates.	Yes. Many companies currently offer automated reporting services while banks are also developing their own in-house systems. These systems can allow for the necessary reports to be produced on a regular basis [60].	Report production is assigned to teams of full-time staff. Automation of this will reduce the workload on this staff and lessen the focus on the construction of reports to allow more focus on improving the quality of the final reports.
25	324	Monitor that the reports are appropriate for the business	323	325	Once compiled, all reports are reviewed by appropriate personnel and management to determine correctness. Regular review sessions will use the reports for analysis.	To some extent. The reports produced can be checked that all requirements are met. However, changes in requirements or new reports required will need human input.	To some extent. The reporting process can include an automated checking process to ensure that the reports produced meet defined requirements. However, actual appropriateness in a changing environment can only be determined by the appropriate management.	Automated checking of reports will thoroughly check every aspect of the document for errors. However, it will not be able to identify where the overall content is still appropriate when taking into account changing reporting requirements or the need for new reports.
25	325	Take control action to ensure the reports produced are appropriate for their purpose	324	-	Management will feed back the issues to the relevant reporting teams to ensure the necessary changes are made to the	No. The problem will likely be previously unknown and therefore no pre-defined solution will exist.	No. A manual correction to the reporting process is required.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					existing manual or automated reporting systems.			
26	326	Define security	-	327, 329, 330, 332	All banks will employ security and risk professionals that will have defined roles set by management.	No. The definition of security will be derived from the expectations of management and customers. Once undertaken, the result will have long-term relevance.	No. Automation is not required and the activity requires management input.	N/A
26	327	Define the key concepts of information security	326	332, 333	IT security and risk teams will define the expectations for customer and business data [61].	No. The activity will only need to be undertaken once.	No.	N/A
26	328	Identify the information assets of the organisation	-	334, 343	Analysts will assess the whole organisation to identify those information assets that have value, risk and lifecycles. The activity will involve seeking feedback from all areas of the business to ensure each aspect has been covered [62].	No. A physical analysis of the entire organisation is required while the value or risk of a particular information asset is often a subjective judgement.	No. The activity must be carried out by a suitably skilled analyst.	N/A
26	329	Identify the processes requiring appropriate security	326	334	The analysts will cooperate with the IT department to determine which processes are relevant to each information asset.	No. Systems across the entire organisation will need to be identified and with the size of major banks, not all business functions have physical links to others.	No. A skilled analysis of the existing systems and assets is required.	N/A

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26	330	Identify the desired security culture of the organisation	69, 326	331	The Board and senior management will have expectations of the security culture of all staff.	No. The activity will require subjective input from management while the activity will also not occur regularly.	No.	N/A
26	331	Determine how to develop a culture of security throughout the organisation	330	339	Management will decide how to realise the desired security culture with employees. Chosen methods often include regular security training and use of appropriate security controls ensuring employees work in the correct way.	No. The activity will involve the analysis of several possible methods to determine what management believe would be the best course of action.	No. The chosen method will have implications throughout the whole organisation and also have long-term relevant so automation is not desired.	N/A
26	332	Identify constraints on the business arising from security and relevant information legislation	326, 327, 346	335	Security and risk personnel, along with compliance and legal teams will identify constraints of relevant information security and legislation on all aspects of the business.	No. Each identified constraint will be the result of skilled analysis of the required security or legislation in conjunction with the relevant aspect of the organisation.	No. Suitably skilled personnel are required to identify the constraints on the organisation.	N/A
26	333	Determine risk assessment approach	327	334	Suitably skilled risk and compliance personnel will assess the scope of the organisation and develop an appropriate risk assessment approach, which will be agreed by management. Automated risk assessment and management systems	No. Several standards exist that offer template approaches but the size of a banking organisation may mean that amendments may be required in certain areas.	No. The determination of the approach will be made by suitably skilled personnel. The resulting approach however may be an automated system.	N/A

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					are often used in major organisations.			
26	334	Undertake risk assessment to determine security threats to the information assets	328, 329, 333	335	Suitably skilled analysts are usually employed to undertake the risk assessment using the defined procedure.	Yes. Each asset is individually assessed to determine risks to the business.	Yes. Several automated systems currently exist offering complete automation of the risk identification and management process [63].	The assessment is undertaken thoroughly and a standardised approach means consistency between all risks. The initial outlay would be outweighed by the benefits and reduced resources required by the automated system.
26	335	Identify possible security controls	332, 334	336	Suitably skilled analysts and IT departments will cooperate to identify a number of possible controls.	Yes. Dependent on the types of risks the organisation has, certain sets or categories of controls may be appropriate.	Yes. The Symantec IT Compliance suite offers a service to define the IT environment and risks to determine the controls needed [64].	Automated systems offered by specialist firms will naturally be able to identify the most up-to-date controls available. Aside from this, suitably knowledgeable personnel could identify categories of controls.
26	336	Assess identified security controls for their appropriateness for organisation	335	337	The analysts and IT department will assess each control to determine the most suitable solution for the identified risks.	Yes. The identified risks and controls can be assessed to determine the best fit.	Yes. Automated IT Risk and Compliance software can determine the most suitable IT controls for each system.	Each possible control can be assessed quickly to determine the most suitable option to ensure the systems are compliant and secure as soon as possible.
26	337	Select appropriate security controls	336	338	Based on the assessment of each control,	Yes. Based on the assessment, it will be	Yes. Automated IT control tools can	The necessary controls can be assessed,

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					appropriate selections will be made and require authorisation by management.	possible to identify the most suitable controls for the optimum level of security.	determine the most suitable security controls for the current systems.	selected and implemented quickly.
26	338	Implement security controls where necessary	337	339, 341, 343	IT personnel with the necessary capabilities will implement technical controls into the existing systems and processes.	To some extent. While some systems may require manual amendments to ensure security, other controls can be automatically mapped to existing procedures.	To some extent. The Symantec IT Compliance suite offers automatic mapping of IT controls to existing procedures and policies [64]. Some manual security controls will inevitably be needed and will require physical coordination.	Automated implementation will reduce the need for expensive technical personnel, whilst employing the controls across the entire organisation far quickly than the manual process.
26	339	Assess the security culture of the organisation	331, 338	340	Many companies assess the existing culture by using surveys and focus groups to gather feedback from employees. I have personally experienced this in the form of quarterly employee questionnaires at Halifax.	Yes. The process may involve the development and circulation of an appropriate set of questions to allow for sensible answers that can be analysed to determine what employees think of the existing culture and working environment. However subjective feedback may require manual analysis.	Yes. This process can be automated to periodically ask employees for feedback, collate the responses and build reports based on the data.	The manual collection of employee feedback is a lengthy process and an automated system could deliver a massive response far more quickly. However, to ensure that the questionnaire is appropriate for that point in time, human input may be required to develop the most suitable set of questions.
26	340	Take control action to ensure the security controls lead to the development of the desired security culture	339	-	Management will identify the necessary action to take to ensure the controls lead to the desired security customs	No. The problem may be organisation-wide and require the development of a suitable solution.	No. Management input is required.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					of employees. This may include the publication of the use of controls for example.			
26	341	Monitor that the controls remain appropriate for the organisation	266, 338	342	Compliance and risk teams will regularly review the systems in place to ensure that the level of security is as required.	Yes. The systems can be monitored to ensure that there are no breaches of security. Any instance of security failure can be flagged for review.	Yes. The monitoring of IT controls can be automatically achieved via services offered in automated tools, such as the Symantec IT Compliance suite. Physical information security controls will require reviewing of effectiveness by appropriate personnel at each location.	The initial cost of the automated tool will be outweighed by the benefits of constant monitoring. Automation will instantly identify when controls are no longer appropriate as well as potentially implement the necessary changes.
26	342	Take control action to ensure the appropriateness of security controls	341	-	Appropriate technical personnel will be made aware of the problems and make the necessary changes to the controls to ensure security.	To some extent. As long as the problem is well-defined, all possible IT controls can be re-evaluated to determine suitability.	To some extent. As long as the problem is not too complex and is well-defined, automated tools can adjust the existing controls. Physical information security controls will require a manual assessment and adjustment.	Yes. Automated control action to ensure security will mean that the systems are constantly secure from well-defined risks.
26	343	Monitor the security of the organisation's information assets	328, 338	344	IT security and risk teams are employed to regularly assess the security of assets in the face of new threats.	Yes. The systems can be monitored to ensure that there are no breaches of security. Any instance of security failure can be flagged for	Yes. The monitoring of IT controls can be automatically achieved via services offered in automated tools, such as the Symantec IT	The initial cost of the automated tool will be outweighed by the benefits of constant monitoring. Automation will

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
						review.	Compliance suite. Physical information security controls will require reviewing of effectiveness by appropriate personnel at each location.	instantly identify when controls are no longer appropriate as well as potentially implement the necessary changes.
26	344	Take control action to ensure the security of the organisation's information assets	343	-	The security controls will undergo a physical assessment to identify where the problem exists and appropriately skilled personnel will amend the IT controls.	To some extent. Well-defined problems can be fixed with the implementation of more suitable IT controls.	To some extent. Automated tools can implement the necessary changes in the case of well-defined problems. New problems or physical security controls will require some form of manual assessment and alteration.	Yes. Automated control action to ensure security will mean that the systems are constantly secure from well-defined risks.
27	345	Know about legislation relevant to the banking industry	-	346	Legal teams are employed to identify any legislation relevant to the organisation.	No. The activity will require skilled identification of the relevant legislation and once undertaken, the activity will not be regularly occurring.	No. Regulation will be set from various sources and once identified, the activity will not be undertaken again unless changes are identified.	N/A
27	346	Determine regulatory requirements of the organisation	345	56, 144, 159, 202, 307, 332, 351	Legal and compliance teams with the necessary capabilities will assess each section of legislation to determine the requirements on the organisation.	No. The activity will require the skilled assessment of the legislation. The impact of this activity will also have a significant impact on the whole organisation.	No. Input from suitably skilled personnel is essential.	N/A
27	347	Define the economic environment	39	348	Using intelligence gathered and	The activity will involve analysis of the current	Yes. Automated intelligence software can	The activity is fairly simple and involves the

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					assessment from the environment, business analysts can define the economic environment with respect to the organisation.	environment and subjective determination of what is relevant to the organisation.	be used to collect relevant data on the economic environment, ready for a skilled assessment.	collection of relevant data from the environment. Automation will ensure this task is achieved far more quickly than the manual version.
27	348	Determine the effects of the economic environment on the organisation	347	351	Strategists or business analysts will analyse the current economic environment to determine the impact on the business.	The activity will require a skilled assessment of the intelligence and the results can have a significant impact on the decisions the business owners make.	Although automated intelligence assessment can be used, new threats, opportunities and risks will arise regularly that an automated system may not recognise. The importance of knowing the economic environment may mean that manual analysis is still preferred.	While automation may be possible, previously unidentified threats and opportunities to the business may not be recognisable to an automated system. Acknowledging certain factors at a late stage can have damaging effects on an organisation.
27	349	Identify the financial targets of the organisation	-	108, 190, 351	The Board and senior management will have specific expectations of the business, allowing financial teams to use relevant tools to derive suitable financial targets.	Yes. Analysis of historical financial data can be used to determine suitable targets for the short term.	Yes. Automated tools are currently used in financial departments to derive suitable budgets, forecasts and targets.	Significant time is spent manually analysing financial data, although an automated system may lead to a level of inflexibility with the targets.
27	350	Define company policies	-	20, 307, 351	Human resource, legal and operations team liaise with management to create the necessary policies to ensure the business can operate as	Dependent on the factors to consider, pre-defined decisions regarding policy can be selected.	Yes. Automated policy creation tools exist and implement the necessary tools as well as define the policies to adhere to various regulations [65].	Many business hours are spent creating policy documents for various regulations and other factors. An automated tool to

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					expected.			initially create policies and amend as required will reduce the human resources required to undertake the activity.
27	351	Assess the impact of constraints on each activity	346, 348, 349, 350	352, 354	Legal, risk and compliance teams will assess the impact of constraints on the overall business, while each department will identify the impact of constraints on their own activities.	No. Each affected activity will require individual analysis, while suitably skilled personnel will identify the overall impact on the activity.	No.	N/A
27	352	Decide how to react to these constraints	351	353	Legal and compliance teams will assess each constraint and decide the necessary course of action to take.	No. The activity will require some skilled input, while the results will also have lasting relevance.	No.	N/A
27	353	Notify controllers	352	-	Appropriate risk and compliance officers are made aware of the required procedures while operations teams are instructed to ensure existing systems are compliant.	No. Each constraint may impact multiple areas of the business and each will need to be identified and notified of the requirements.	No.	N/A
27	354	Assemble constraint list for each activity	351	355	The organisation and all activities require analysing to determine relevant constraints. High-level constraints such as legislation can be identified by a single	No.	No. Both computerised and manual activities will require assessment to determine the constraints for that activity.	N/A

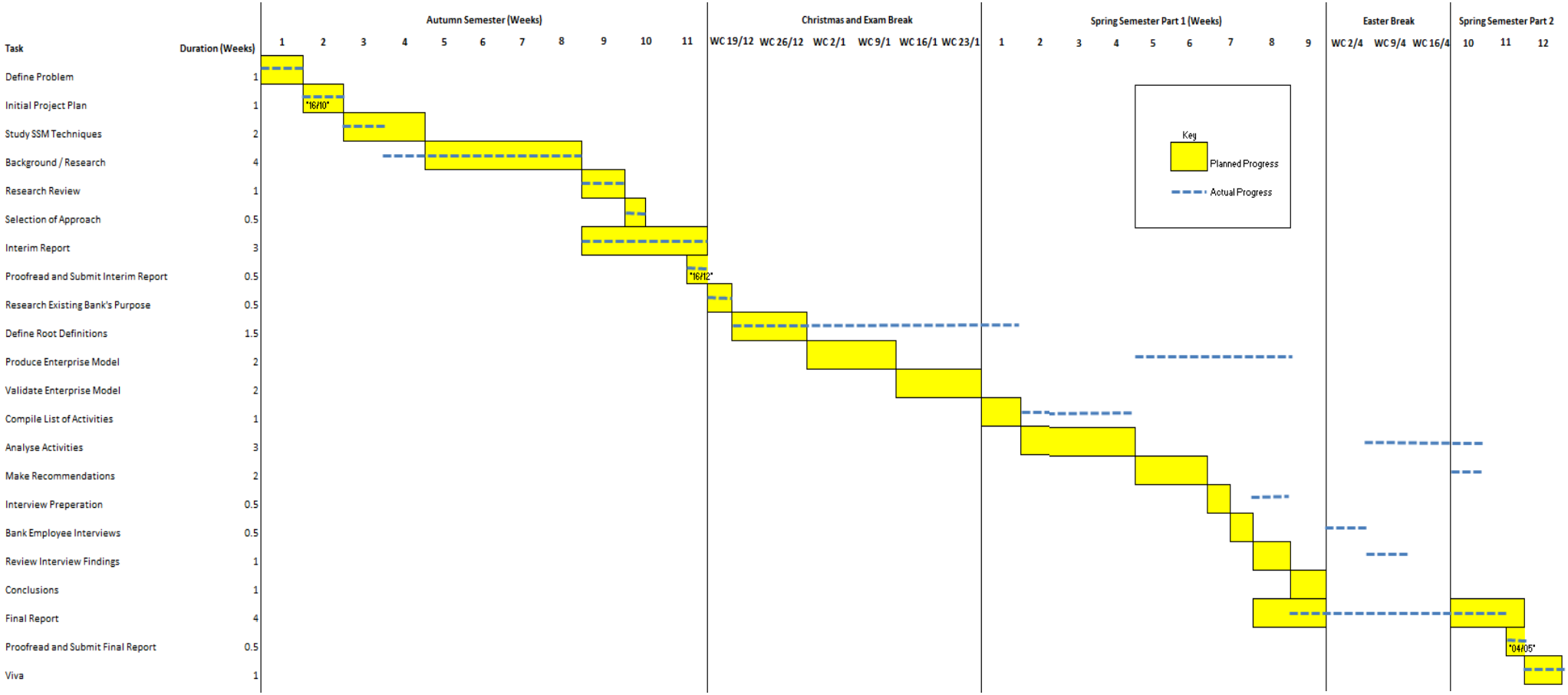
SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
					legal team while processes in each department can be assessed by appropriate personnel.			
27	355	Assess conformance of activities with constraints	354	356	System testing prior to implementation is standard procedure while compliance checking is undertaken periodically to determine ongoing conformance.	Yes. The relevant activities will be assessed in turn to determine if all aspects conform to the identified constraints. Any instances of non-conformance will be highlighted.	To some extent. Automated testing can be employed to ensure systems conform to constraints, while exception handling can also be built in to identify any errors that occur during operation. Manual activities will require a physical assessment.	Automation will highlight any errors as soon as they arise whereas manual processes that do not conform may not be identified for some time which may have an impact on performance, customer satisfaction and reputation.
27	356	Take control action to ensure the conformance of activities with constraints	355	-	Management will identify the changes that are required and appropriate personnel will carry out the instructions to ensure activities conform to constraints.	No. The problem is likely to be previously unknown and therefore no pre-defined solution will exist.	No. Each necessary action will need assessment on its own merit to determine the necessary action.	N/A
28	357	Decide on relevant factors to measure performance of the business functions	-	358	Senior management of the organisation and each business function will determine appropriate factors to measure performance. These are regularly altered as requirements change.	No. The determination of factors is based on the desires of management and requires agreement from relevant parties.	No. The activity will require management discussion and agreement.	N/A

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
28	358	Gather performance information	357	359	Each individual business function (e.g. credit cards, mortgages) produces performance information on a regular basis. Additional commentary is often provided to provide further insight into the results.	The activity essentially involves the collection of data from pre-defined sources and will include information such as sales, profit and customer retention. Information gathering algorithms exist that are able to do this activity as long as the sources are well defined.	Automated reporting systems already exist to capture the required performance of a business or specific department.	From personal experience, I know that the collection of the required amount of data for a performance review can be a lengthy process and involves communication with multiple individuals. Automation of this system could dramatically reduce the information gathering time.
28	359	Assess performance of business functions	358	360	Targets will be set for each performance measurement, based on historical data or business expectations. Comparison is made between targets and results to identify the performance. Often special circumstances or incidents permit the justification of poor performance	The task essentially involves comparing actual results with pre-defined targets and can be easily automated to do as such.	Yes.	Automating an activity to simply compare targets with results many not allow for the consideration of special circumstances and can result to unfair bias in the comparison.
28	360	Determine how performance of business functions contributes to overall performance	359	363	The Board will identify the impact that each business function has on the overall organisation.	An algorithm could be used to determine the contribution that each business function, such as credit cards and mortgages, has had on	Yes. Historical data can be analysed to determine the trends in the performance of each business function compared to the overall	This task is not one that would take place on a daily basis so automation may not provide great benefits over the current

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
						the business in the past. This could then calculate the portion of the performance that can be attributed to the particular business function.	performance of the organisation.	manual process used.
28	361	Identify business owners	-	362	This activity is not explicitly undertaken. Business owners are all shareholders.	No.	No.	N/A
28	362	Define owner expectations	361	363	The expectations of owners will be derived from shareholder meetings and by the Board of Directors who operate the business in the best interests of the owners as well as customers.	No. Owner expectations can change depending on the current environment and is a significant determining factor in the development of the strategic plans of the organisation.	No. The activity involves the collection of opinion from shareholders and discussion by the Board. The fact that the activity drives the development of the strategic plans means that many shareholders will not permit the automation of this activity.	N/A
28	363	Determine relevant measurements for overall performance	360, 362	364	The Board or upper management will determine the factors to judge the performance of the organisation. These will be reviewed when needed and new factors will be included when identified.	No. The initial choices will be the result of discussion between management of the various business functions while any proposed amendments to the measurements will also be discussed to determine their relevance.	No.	N/A
28	364	Monitor that business	Sys	365	I have had experience of	Essentially the activity	Automated monitoring	It may be difficult to

SS	Act. No	Activity	Input Act.	Output Act.	How is it Currently Done?	Involves Programmed Decisions (PD)?	Can it be Automated?	Costs / Benefits of Automation
		performance is meeting expectations	perf info, 363		monthly performance reviews of LBG Credit Cards where the past month's performance is compared to historical data and the targets. Each performance measure is provided along with some relevant commentary.	involves a comparison of data and consideration of various commentary statements. An algorithm can easily compare the data but allowing for all possible exceptional circumstances may not be feasible.	of business performance is possible and could provide in-depth analysis of trends and influencing factors. At present, the monitoring of the previous month's performance and the identification of necessary control actions take place in the same management session, therefore automation may not be essential.	cater for all possible exceptional circumstances that could be included in the commentary of a performance measure. The monitoring sessions take place to review the previous month's performance, while any management action is also highlighted in the same session. Therefore automation may not be greatly beneficial but it could identify performance trends quicker than is currently seen.
28	365	Take control action to ensure that business performance meets owner expectations	364	-	As part of the monthly performance review session, any required control action is identified by management and allocated to the relevant team.	This may include aspects of PD such as how to optimize a certain activity but each control action usually needs agreement by management.	The output from this activity may be to automate a particular process but the act of making that decision is still something that would usually require management input, especially if the proposed change is significant.	N/A

Appendix H - Gantt Chart and Actual Progress



Appendix I - Project Diary

WC = Week Commencing

Autumn Semester

Week 1 (WC 03/10/11) – I gained approval from my supervisor regarding the project topic and began to draft initial project plan.

Week 2 (WC 10/10/11) – Showed the first draft of the initial project plan to both the project supervisor and moderator to get feedback on any required changes. Once the changes were included, the completed initial project plan was uploaded onto PATS for final approval.

Week 3 (WC 17/10/11) – Began my research into the related topics by finding a number of relevant articles, journals, websites and books as well as purchasing Brian Wilson's book on SSM to be used as a reference and a guide throughout the project.

Week 4 (WC 24/10/11) – I continued research into related areas, focussing primarily on process automation and previous examples of automation in the global banking industry.

Week 5 (WC 31/10/11) – Focus of the research shifted to the academic questions posed by the project such as validation of models and value of generic models. I also met with my project supervisor to discuss research progress.

Week 6 (WC 07/11/11) – No project work carried out due to coursework commitments.

Week 7 (WC 14/11/11) – No project work carried out due to coursework commitments.

Week 8 (WC 21/11/11) – No project work carried out due to coursework commitments.

Week 9 (WC 28/11/11) – Results of previous research collated together and the basic structure of Interim Report was set.

Week 10 (WC 05/12/11) – I attended the project lecture regarding the Interim Report and amended my structure accordingly to include the relevant details. I also began to write the report with first draft of the introduction and literature review completed.

Week 11 (WC 12/12/11) – Met with project supervisor to discuss the structure and content of the Interim report and he suggested some minor alterations. Wrote up the remaining sections of the report and proofread before online submission to PATS.

Christmas Break and Exam Period

Week 1 (WC 19/12/11) – Created rough, first draft of Root Definitions based on research and personal knowledge of the industry.

Week 2 (WC 26/12/11) – No project work carried out over Christmas week.

Week 3 (WC 02/01/12) – No project work carried out due to revision commitments.

Week 4 (WC 09/01/12) – Met with supervisor to discuss first draft of Root Definitions and was provided with valuable feedback and guidance on where to focus to improve quality.

Week 5 (WC 16/01/12) – No project work carried out due to exam commitments.

Week 6 (WC 23/01/12) – No project work carried out due to exam commitments.

Spring Semester Part 1

Week 1 (WC 30/01/12) – Used supervisor feedback from Week 4 of Christmas Break to vastly improve quality and richness of Root Definitions.

Week 2 (WC 06/02/12) – Working towards final version of Root Definitions and began to comprise list of potential activities and subsystems.

Week 3 (WC 13/02/12) – Finalised Root Definitions for Enterprise Model and continued to expand list of activities and subsystems.

Week 4 (WC 20/02/12) – Finalised list of activities and subsystems and began to compose subsystem diagram and Enterprise Model.

Week 5 (WC 27/02/12) – No project work carried out due to coursework commitments.

Week 6 (WC 05/03/12) – No project work carried out due to coursework commitments.

Week 7 (WC 12/03/12) – Finalised subsystem diagram and used this to compose latest draft of Enterprise Model. Also began to set up interviews with industry people as part of the model validation process.

Week 8 (WC 19/03/12) – Completed the enterprise model for use in forthcoming interviews. Set up necessary interviews and drafted a list of possible questions.

Week 9 (WC 26/03/12) – Began to lay out structure of Final Report along with further research into area of automation and algorithms.

Easter Break

Week 1 (WC 02/04/12) – Concluded interviews and began to write up introduction and research sections of Final Report. Also met with supervisor to discuss what is required for the analysis of the Enterprise Model and expected outcomes.

Week 2 (WC 09/04/12) – Produced final version of Enterprise Model with post-interview changes included. Completed research section of the Final Report and began analysis of activities.

Week 3 (WC 16/04/12) – Analysis of the activities was undertaken on a full-time basis for this week.

Spring Semester Part 2

Week 10 (WC 23/04/12) – Analysis of the activities was undertaken on a full-time basis for the first 3 days of this week until it was completed. This allowed conclusions and recommendations to be derived before work began on the first draft of the Final Report.

Week 11 (WC 30/04/12) – The Final Report was worked on each day during this week until the draft version was completed on Wednesday. The remaining days were then used for checking and proof-reading the content of the report before final submission.

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