



UNIVERSITEIT VAN PRETORIA  
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***AN ENTERPRISE ARCHITECTURE APPROACH:***

***Towards a method for process standardisation across different  
business units at a tertiary education institution***

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## ***EXECUTIVE SUMMARY***

History has shown that companies survive because they are able to adapt to change faster than their competitors. EA gives organisations the agility necessary, by creating a holistic view of the enterprise and thus identifying business/IT alignment and integration possibilities. It is believed that the EA drivers should not lie within IT, but is rather a concern of business. IT should thus be a supporting function in delivering a good EA. Tertiary education institutions are hard to change because of their complex socio-technical structure, despite the fact that they experience extreme pressures to increase operational efficiencies and agility. EA tools and techniques have been widely adopted by the commercial and public sectors however, it is still widely unknown in the education sector.

The University of Pretoria launched an achievement plan to aid the University in their main goal – to be an internationally recognised research and teaching institution. This project was aimed at Enterprise Architecture to direct the University's IT functions.

The core of this project is based on the EA paradigm created by Ross et al (2006). The first component of the paradigm states that the level of business process standardisation and integration must be defined in the Operating Model for organisations to strive. It is however not such a simple task to perform and the methods for identifying process standardisation opportunities are explored in this project.

The research entails a case study conducted at the University to help in the development of a method to identify possible standardisation opportunities within its core business processes across different business units. The study was conducted within the Enterprise System Renewal Project which supports the core functions along the University's Value Chain.

A literature study was conducted to identify the appropriate EA tools and techniques that may aid the development of solutions of this project. Case studies that were conducted provided meaningful insights on applying EA in HE and it proved to be a fruitful tool. This document describes the theoretical and organisational context on which the research rationale is based upon. It defines the scope and the aim of the research to be done. Problem analysis and data gathering have been performed and

will be discussed in this document. However, it was discovered that the Programme Amendment process had most potential for possible process standardisation opportunities and is thus the process under concern for this project. Three conceptual methods were developed for identifying standardisation opportunities. The methods were tested and the most suitable method was identified. The method was further validated by applying the method with different Programme Amendment processes followed by various parties in an attempt to develop a best practice process. The document is concluded by delivering results of the research and recommendations.

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## ABBREVIATIONS

<b>Terminology</b>	<b>Description</b>
<b>EA</b>	Enterprise Architecture
<b>ICT</b>	Information and Communication Technology
<b>IEEE</b>	Institute of Electronic and Electrical Engineering
<b>IT</b>	Information Technology
<b>JISC</b>	Joint Information Systems Committee
<b>LEA</b>	Lean Enterprise Architecture
<b>OM</b>	Operating Model
<b>TOGAF</b>	The Open Group Architecture Framework
<b>UP</b>	University of Pretoria
<b>HE</b>	Higher Education
<b>FE</b>	Further Education
<b>UK</b>	United Kingdom
<b>EBIT</b>	Engineering, Build Environment and Technology (a Faculty at UP)
<b>HEI</b>	Higher Education Institution
<b>BA</b>	Business Architecture
<b>KCL</b>	King's College London
<b>E2E Process</b>	End-to-End Process
<b>FSP</b>	Financial Service Provider
<b>TUT</b>	Tshwane University of Technology
<b>ADM</b>	Architecture Development Method
<b>SUM</b>	Service Usage Models
<b>HAP</b>	Head of Academic Planning
<b>BPMN</b>	Business Process Modelling Notation
<b>BPMI</b>	Business Process Management Initiative
<b>EPC</b>	Event-driven Process Chains
<b>BPM</b>	Business Process Management
<b>SADT</b>	Structured Analysis Development Technique
<b>HoD</b>	Head of Department
<b>EMS</b>	Economic and Management Sciences Department



# 1. INTRODUCTION AND BACKGROUND

## 1.1 THEORETICAL CONTEXT

### 1.1.1 Background

The Information Age has arrived and is rapidly unfolding, just as predicted by sociological prognosticators. Businesses are in the middle of the transition from the Industrial Age to the Information Age. The scientific measurements for the lifecycle of a transition between two ages is 40-years and it is believed that this transition started at least 20 years ago (Finkelstein, 2006). This makes it imperative for enterprises to start evolving, before it is too late.

In this Information Age, competition is growing rapidly as a result of global markets, the internet and technology. The power has shifted from the manufacturer into the hands of the customer. Corporations' strategy should not be to find a good product and then customers to sell it to, but rather to find good customers and then to find a product that suits their needs (Finkelstein, 2006). Businesses must be agile to respond to customer needs before its competitors do. Changes in government regulations, which are inevitable for global enterprises, as well as new technologies also contribute to the need to be agile.

For an enterprise to thrive in the rapidly changing environment faced today, it has to identify and digitize the core processes of the business. Although this approach results in individual processes being less flexible, it gives the company more agility. The rationale is that if the time spend on routine operations is reduced, management can focus their attention on higher priority issues such as new business opportunities and responding to customer needs (Ross *et al*, 2006).

With technology, especially IT, advancing in the marketplace it becomes critical for organisations to integrate these new technology trends with business. Technology should be used as a leverage tool to gain an advantage above competitors by bringing new products/services into the market first. (Theuerkorn, 2005) Unfortunately a barrier exists between technology and business processes in many corporations. Moreover, as technology evolves and becomes even more complex, the need for integration also increases. Although IT and business differ in skills, needs and perspectives, good communication between them is essential. According to Theuerkorn (2005), the overall success of an organisation depends on the integration and communication between IT and business.

EA was previously perceived to be the responsibility of the Information Technology Departments in an organisation (De Vries & Van Rensburg, 2009). This resulted in individual solutions for each strategic initiative which made EA projects prone to failure. Today, EA should not be the responsibility of IT, but rather the concern of business (Ross *et al*, 2006). Business should be combined with IT capabilities to create a map for future strategic decisions (Janse van Rensburg, 2008). This is the core goal of building a valuable Enterprise Architecture.

### **1.1.2 Impact on Higher Education Institutions**

The impact of technology changes and competition, discussed in section 1.1.1, also influence HEI in a concerning manner. It is expected from universities to do more with less. The diversity and the number of students are increasing together with the increasing competition in the market (Bradwell, 2009).

These technology changes in the context of a HE environment result in the increasing web-based portals developed by Higher Education Institutions. According to Van der Merwe (2005), student online registration also increased from 20.9% in 1998 to an astonishing 70,9% in 2003. Seven years later, one can only assume that these figures increased even more.

### **1.1.3 Business-IT Alignment**

Business/IT alignment is defined as how business and IT are integrated to form a harmonious and synthesized union (Luftman & Kempaiah, 2008).

Organisations operate with a gap between its IT functions and business objectives. There are multiple reasons for this rift. One of the reasons is because in the transformation from manual processes to automated processes, organisations transformed their technologies without considering or redesigning the effect on the business processes (Finkelstein, 2006).

IT should be aligned to the corporate strategy and should fit into the infrastructure of the enterprise. This approach to IT integration gives the organisation the functionality to deliver products/services with minimal effort. (Theuerkorn, 2005)

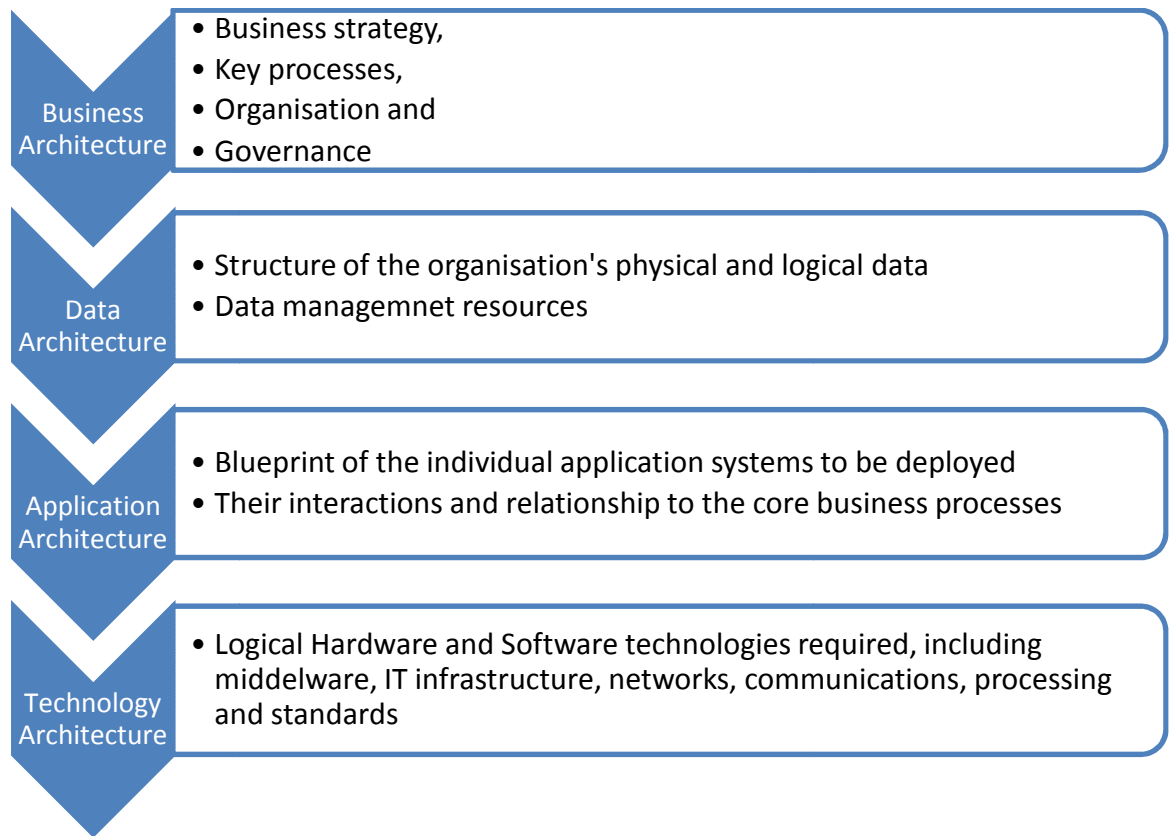
EA emerged from this need to identify business and IT integration and alignment opportunities by mapping a holistic description of the enterprise (De Vries & Van Rensburg, 2009). Ross *et al* (2006) developed a new approach for Business-IT alignment, of which EA is one component. They argue that organisations currently define a strategic direction and then IT creates IT-enabled solutions for each strategic initiative. This means that IT must redesign the applications and infrastructure for each new strategy. There is no agility in the organisation. Three other pitfalls of this approach is that business strategies are not always clear enough to act upon, each individual solution is applied to a different technology and IT becomes a bottleneck because it is always based upon the latest strategy. This causes IT to be a liability rather than an asset.

### **1.1.4 Enterprise Architecture**

Enterprise Architecture was first identified and developed by pioneers such as John Zachman and Eberhardt Rechtin in the 1980's. Zachman realised important comparisons between the building of any complex thing such as aeroplanes or buildings and enterprises' information systems. One of the most significant comparisons he identified was that no quick or safe changes can be made to a complex object without looking at the descriptive representations (i.e. a map) of the object (Zachman). Ross *et al* (2006) argue that these blueprints are represented by a core diagram, depicting the holistic view of how a company operates.

Many definitions of EA are available, according to the different perspectives:

- JISC defines EA to be the “dynamic way of describing and aligning the functional aspects of the organisation: its people, activities, tools, resources and data/information, so that they work more effectively together to achieve the organisation’s business goals”.
- Zachman (1997) describes Enterprise Architecture as the set of descriptive representations that describes the enterprise in such a manner that it can be maintained and designed according to the business’ requirements.
- LEA defines enterprise Architecture to be the alignment of all the business processes to meet the goals of the organisation from a holistic perspective. Enterprise Architecture should enable the separate business components to strive towards the same goal, rather than to optimize only one aspect or part of a system. (Theuerkorn, 2005)
- TOGAF 9 defines four types of architectures that all form part of the complete enterprise architecture of an organisation. These types of architectures consist of Business Architecture, Data Architecture, Application Architecture and Technology Architecture. The compilation of these architectures and how they fit together are stipulated in Figure 1.
- Ross *et al* (2006) define EA to be the “high-level logic for business processes and IT capabilities” (Ross *et al*, 2006, p.48).
- Enterprise Architecture combines a collection of processes, methods and principles of an enterprise in a holistic manner to be able to understand, build and change business processes. (Janse van Rensburg, 2008)



**Figure 1: TOGAF 9's four types of Architectures**

McGregor (2007) and Ross *et al* (2006) identified the following as typical triggers for EA to be initiated:

- **Current National and Political Environments:**  
Regulatory compliance issues such as Sarbanes-Oxley, King II, Basel II, FICA, HIPAA and IAS 2005. Globalization of companies makes them accountable for these complex reporting requirements. Each of these drives an enormous amount of organisational and system change.
- **Agility of Businesses**  
Greater globalization, increasing regulation and faster cycle times require for organisations to quickly adopt to the changes.  
Government-driven regulations, such as safety, health, environment and quality, which introduce deep and enduring systemic change, along with complex, non-negotiable checks and balances.
- **Mergers and acquisition, which result in a need to bring two or more business models together.**
- **Major system implementation.** This refers to initiatives such as ERP, business intelligence or business performance management, or major system conversion (main frame to open systems etc).
- **Growing complexity in companies' systems:**  
Systems are so complex that any change requires redesigning of all the other systems that is connected.

By implementing EA, value is created by focussing and complimenting the organisation's main strategies (Ross *et al*, 2006). The foundation of execution of Ross *et al* (2006) starts with the defining an Operating Model, which dictates the strategies that need to follow.

Various frameworks exist for EA. These include frameworks such as the Zachman Framework, Lightweight Enterprise Architectures approaches and the TOGAF framework. Some of the frameworks focussed on mapping the current EA of an organisation, creating a future state and then developing a migration plan to reach the gap between the current and future states. This led to EA being accused of needing high maintenance and creating ivory towers. Ross *et al* (2006) developed a foundation for execution to create a blueprint for direction, rather than just looking only at what needs to be changed. This foundation for execution requires that the company defines an Operating Model (OM), use EA for implementation of the OM and then creates an IT engagement model.

### **1.1.5 Using the Operating Model to Achieve Business-IT Alignment**

In order to successfully align business with IT, careful consideration must be given to which processes and IT systems to integrate and standardise. Strategy is often not enough to best support the stable development of IT infrastructure and capabilities of business processes. Ross *et al* defined an operating model to best support the company's strategy. This operating model creates a better guidance for developing IT and business process capabilities than individual business strategies by creating a more stable and actionable view of the enterprise (Ross *et al*, 2006). This OM approach developed by Ross *et al* (2006) is explained in this section.

The operating model defines the necessary level of integration and standardisation, to coincide with how the organisation aims to operate. The OM requires that management must select those business processes that will distinguish them from their competitors. By choosing the wrong processes for the organisation's market will have dreadful consequences, but ceasing to define an OM is just as risky (Ross *et al*, 2006).

The OM consists of two key dimensions which define the four types of models:

- Business process standardisation: Defining the execution of a process regardless of the place of execution or the responsible person.
- Business Process Integration: Shares the data between the organisation units and thus linking them.

Each type of Operating Model is represented in four quadrants. The types are: Diversification, Coordination, Replication, Diversification. The OM and its quadrants can be seen in Figure 2. Each OM represents different opportunities for growth.

Business process integration	High	<p style="text-align: center;"><b>Coordination</b></p> <ul style="list-style-type: none"> <li>• Shared customers, products, or suppliers</li> <li>• Impact on other business unit transactions</li> <li>• Operationally unique business units or functions</li> <li>• Autonomous business management</li> <li>• Business unit control over business process design</li> <li>• Shared customer/supplier/product data</li> <li>• Consensus processes for designing IT infrastructure services; IT application decisions made in business units</li> </ul>	<p style="text-align: center;"><b>Unification</b></p> <ul style="list-style-type: none"> <li>• Customers and suppliers may be local or global</li> <li>• Globally integrated business processes often with support of enterprise systems</li> <li>• Business units with similar or overlapping operations</li> <li>• Centralized management often applying functional/process/business unit matrices</li> <li>• High level process owners design standardized processes</li> <li>• Centrally mandated databases</li> <li>• IT decisions made centrally</li> </ul>
	Low	<p style="text-align: center;"><b>Diversification</b></p> <ul style="list-style-type: none"> <li>• Few, if any, shared customers or suppliers</li> <li>• Independent transactions</li> <li>• Operationally unique business units</li> <li>• Autonomous business management</li> <li>• Business unit control over business process design</li> <li>• Few data standards across business units</li> <li>• Most IT decisions made within business units</li> </ul>	<p style="text-align: center;"><b>Replication</b></p> <ul style="list-style-type: none"> <li>• Few, if any, shared customers</li> <li>• Independent transactions aggregated at a high level</li> <li>• Operationally similar business units</li> <li>• Autonomous business unit leaders with limited discretion over processes</li> <li>• Centralized (or federal) control over business process design</li> <li>• Standardized data definitions but data locally owned with some aggregation at corporate</li> <li>• Centrally mandated IT services</li> </ul>
		Low	High
<b>Business process standardisation</b>			

**Figure 2: The Operating Model, (Ross *et al*, 2006, p. 29).**

The specific OM defined by management for the entire organisation, and not just for individual business units, will provide principles to the direction which the company will follow most of the time.

When an OM has been defined but it does not suit the company's market realities, the company can transform into a new OM. This however is time consuming and uncomfortable but sometimes necessary.

### **1.1.6 Research Problem and Rationale Context**

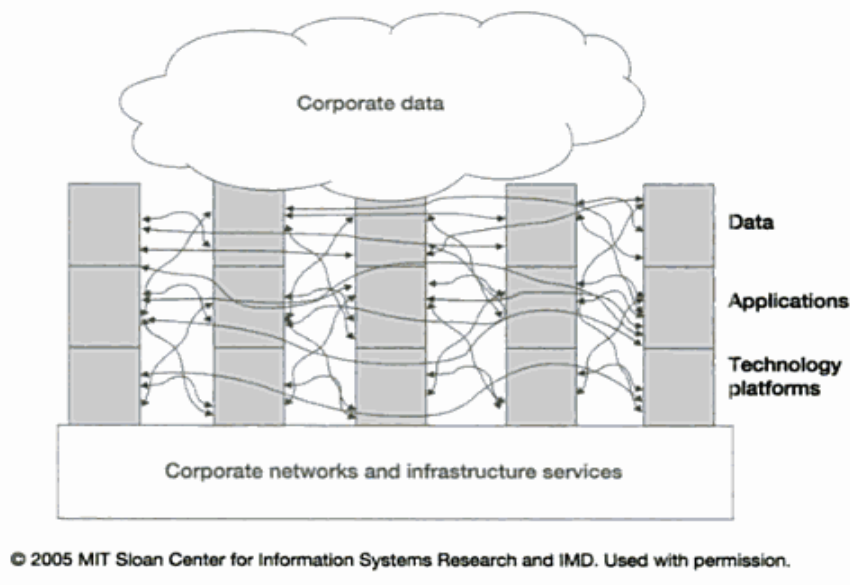
The education sector is a complex socio-technical organisation which faces pressures to increase operational efficiencies and adopt to change. EA has been widely adopted over the last 15 years in the commercial and public sectors.

However, EA is still found to be relatively unknown in the education sector, despite the fact that tertiary education institutions are hard to change (JISC, 2009).

These organisations made some considerable effort to invest in hardware, software and networks, but they were unable to demonstrate the integration and rationalisation of their business processes. The potential gains of EA are being inhibited as a result (Watson, 2007). JISC funded an EA pilot programme at four Universities to investigate the applicability of EA approaches and the TOGAF framework at HEI. One of the conclusions drawn from this study stated that EA approaches may be very fruitful in the HEI environment, however a lighter approach is recommended. This is discussed in detail in section 4.1.2. The University of Pretoria aimed at using a EA light version for the Systems Renewal Project to provide effective support for the University's core functions. The Systems Renewal Project is discussed in section 1.2.3.

Four stages are defined when an enterprise architecture is developed and grown to maturity. The first and most elementary stage is that of Business Silo architecture. The silo's consists of self contained data-repositories according to Watson (2007). The set of silo's have a negative effect on the coordination efforts of the organisation. This result in patchy and error prone data (Ross *et al*, 2006). These higher education institutions still operates according to a 'silo' culture instead of using ICT for supporting strategic business and educational objectives (Watson, 2007). A graphical presentation of this 'silo' culture can be seen in the figure below.

**Capability from traditional approach to IT solutions**



**Figure 3: The Silo structure of the traditional approach to IT solutions, (Ross *et al*, 2006, p.7)**

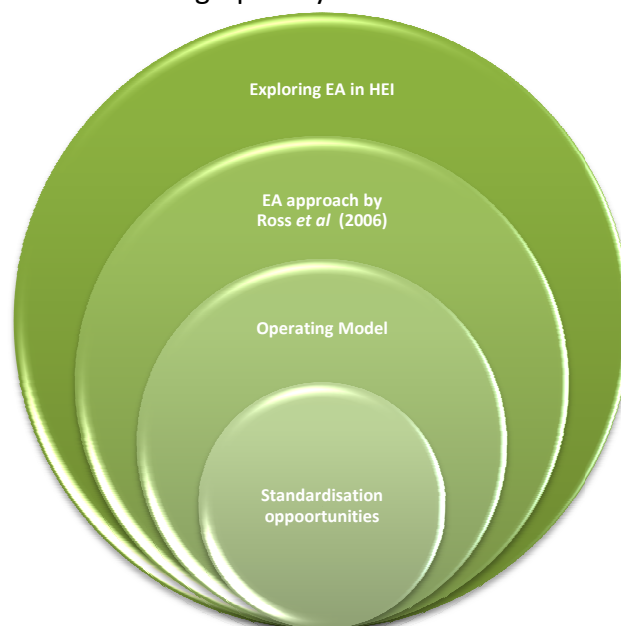
EA should be used to reflect the integration and standardisation requirements of the operating model. Ross *et al* (2006) define an Operating Model to drive the strategic direction and process standardisation and integration of an organisation.

There is some deficiencies of the Operating Model. De Vries & Van Rensburg (2009) identified them to be as follow:

- The identification of the level of standardisation that is required to categorize the current operating model of an organisation is difficult to establish. This was a result of organisations that behave according to multiple operating models.
- The necessary information to do the identification of the current operating model is not always available or difficult to find. This was supported by the fact that EA is a relatively new discipline and organisations only have some degree of EA awareness and knowledge.
- The boundaries between the business and corporate level made it difficult to establish one single operating model.

TOGAF 9 also refers to an Operating Model as defined by Ross et al (2006). TOGAF 9 (p.331) states that a corporate Operating Model indicates “what type of interoperability approach will be appropriate” and that a corporate Operating Model “be determined in Phase A (Architecture Vision) if not in Phase B (Business Architecture), and definitely by Phase E (Opportunities & Solutions)”. It seems as if this vision for a corporate OM may only be appropriate once some architecture work has been performed. The scope of architecture work that may be required is however not stipulated.

The OM requires the identification of possible process synergies between business units, as well as process integration (data sharing) opportunities. According to Porter (2004) one should find opportunities to share activities in the value chain among related business units due to the presence of common buyers, channels, technologies and other factors. The desired level of standardisation that is required to categorize an organisation according to an operating model and its influence on the value-creation model of the business is still unknown. It also seems that identifying possible standardisation opportunities, as a stepping stone in standardising core business processes, is a tedious task to perform and not many methods supports this objective. Figure 4 below indicates the context of the research problem and rationale graphically.



**Figure 4: Context of Research Problem and Rationale**



### **The main research question is:**

What methods can be used and what do these methods entail, to identify possible standardisation opportunities within any end-to-end core business process across different business units at the University of Pretoria.

## **1.2 ORGANISATION CONTEXT – UNIVERSITY OF PRETORIA**

### **1.2.1 Brief History**

The University of Pretoria (TUKS) was first established as The Transvaal University College (TUC) in 1908, starting with four professors, three lecturers and 32 students. Courses were presented in English, Dutch, other modern languages, literature and Natural Sciences. The courses were presented in English, in a four bedroom residential building called the Kya Rosa. Birth was given to the name University of Pretoria as a result of and an act of Parliament and General Jan Smuts on the 10<sup>th</sup> of October, 1930. At this time, the University was the biggest tertiary institution in the country with 900 students (Smith, 2008).

### **1.2.2 Background**

Today, The University of Pretoria offers 1800 academic programmes, some being internationally accredited, in both Afrikaans and English to over 50 000 students. The University is an autonomous, non-for-profit institution, which is governed by numerous statutory bodies as well as an executive management team.

With the University being rated the best research university in the country and one of the largest, this institution offers high quality education to all students of all cultures and races. The University collaborates with world-class partners to ensure that this high quality education is maintained (Le Roux, 2008).

The University comprises of nine faculties and a Business School namely: Economic and management sciences; Education; Engineering, Built Environment and Information Technology (EBIT); Health Sciences; Humanities; Law; Natural and Agricultural sciences; Theology; Veterinary sciences and the Gordon Institute for Business Sciences (Le Roux, 2008).

The Engineering, Built Environment and Information Technology Faculty hosts one of the leading and competitive engineering schools in the country. It keeps strong ties with the industry to support the research and teaching programs. Engineering students graduating from the University of Pretoria benefit from an international accredited degree and the engineering school's high esteem in the industry. This ensures that the University continues to provide meaningful degrees and that the international accreditation status is maintained. With strategic plans for the future, the University strives to continue to provide excellent education for its students (Le Roux, 2008).

The Economic and Management Sciences Faculty is one of the largest at the University of Pretoria, consisting of ten Departments. The faculty is a leading institution of the field of economic, financial and management sciences. The faculty balances the needs of academic, professional and vocational programmes that are

accredited by various national and international professional bodies. Students graduating from this faculty are considered ‘thought leaders’ and can embark on their future challenges as competent, creative, responsible and productive citizens.

### 1.2.3 Problem Context at the University of Pretoria

The primary goal of the University is to be an internationally recognised research and teaching university. To achieve this goal a strategic plan (Innovation Generation, Creating the Future 2007 - 2011) was implemented. Other goals and plans were also developed in order to support this primary goal.

Three key areas were identified for improvement, to achieve this primary goal. A list of objectives and strategies were created and linked to the key areas for improvement. In addition, a range of achievement plans were developed to turn the list of objectives into reality. A holistic view is drawn of the abovementioned strategies and plans, which can be seen in Figure 5. These plans were developed to suit the needs of the country, as well as the continent, in especially the engineering and sciences fields. The University’s Enterprise IT Systems Renewal Project forms part of an achievement plan to ensure effective support for the core functions of the University (Smith, 2008).



Figure 5: UP’s Strategic Plans

### **1.2.3.1 Systems Renewal Project**

The purpose of the System Renewals Project was to standardise and digitize the systems and their related processes at all the departments at the University. As part of the vendor acquisition strategy, it was decided that it will be most advantageous to buy some software, if possible, that best supports the student life cycle process at the University. Oracle PeopleSoft proved to be the best suited solution, with PeopleSoft Campus Solution providing best practices for the student system (Hudson, 2010).

Although EA practices and mechanisms have been initiated in the IT department, EA and its full potential has not been realised. Some of the techniques proposed by Weill & Ross (2004), such as the Governance Arrangement Matrix, has been documented, but has not been developed according to required process standardisation and integration, i.e. an Operating Model.

## **2. RESEARCH AIM**

The purpose of this study is to develop a method for identifying possible standardisation opportunities for any end-to-end process across different units at the University of Pretoria and within its value chain. This method will assess the feasibility of standardising some of the student life-cycle processes across organising units. The project will specifically entail evaluating and assessing standardising opportunities with the Programme Amendment process.

## **3. PROBLEM ANALYSIS AND SCOPE**

### **3.1 DATA GATHERING AND ANALYSIS**

Most of the data gathering was done with the aid of interviews conducted with key persons involved with the Systems Renewals Project and the Programme Amendment process. Other data were collected via research and other resources such as the internet.

An interview with Mr. Barry Hudson indicated that potential for identifying standardisation opportunities lied with the Admit and Enroll Student E2E processes within the PeopleSoft Campus Solutions package encapsulating the student life cycle processes. Hudson (2010, pers. Comm. 29 April) argued that these processes consist of process variants and that this provided potential for this project. However, after an interview was conducted with Mr. Johan Haumann did it become apparent that this argument was not valid and that other opportunities needed to be identified. These processes, Admit Student and Enroll Student, were already mostly standardised. As the PeopleSoft package is going to be enforced, it seemed redundant to investigate those processes (Haumann, 2010, pers. Comm. 4 May). See Figure 6 for the PeopleSoft Campus Solutions high-level process map. Hudson (2010, pers. Comm. 4 May) thereafter recommended to investigate the development of learning material processes, as there has been various complaints about this process.

Mrs. Christa North of the Quality Unit at UP was interviewed to confirm the complaints regarding the quality of the developed learning material as well as the

processes and procedures that need to be followed. It was confirmed by North (2010, pers. comm. 6 May) that this process may hold opportunity for standardisation. It was confirmed that the Quality Unit is having trouble with the New Programme and Regulation Amendment process. The Quality Unit is in the process of making improvements to this process. The current process can be seen in Appendix B as well as the standard proposal form which is used to conceive a new programme/amendment of current programme in Appendix C. North (2010, pers. comm. 6 May) advised to consult with Mr. Fritz Dresselhaus, a consultant at the Education & Innovation unit, to acquire further detail on this process. Mr. Dresselhaus is part of a team responsible for the various programme renewals within the EMS faculty that are currently in progress. A background of the Quality Unit is provided in Appendix G.

An interview was conducted with Mr. Dresselhaus and Mrs. Matete Madiba, another educational consultant, to discuss the programme renewal process. Several insights were obtained from this interview. It was discovered that the programme amendments and development of new programmes are two separate processes and differentiation needed to be made between the two. It was stated that when more than 50 percent of an existing programme needs to be amended that the process is considered as a programme renewal. If it is less than 50 percent changes it constitutes as programme amendments. Dresselhaus (2010, pers. comm. 19 August) provided the theoretical Programme Amendment process that was designed and currently being tested by five programmes within the EMS faculty. The process can be seen in Appendix E. It was decided to focus this project on the Programme Amendment process, as it is a more common process and more evidence and information are available on this process. Dresselhaus (2010, pers. comm. 19 August) recommended other parties that may be consulted for their involvement and experience with the Programme Amendment process. It was discovered that a curriculum mapping attempt and tool were endorsed by the EMS Dean and are currently being implemented. A mapping tool, Atlas is being used for the curriculum mapping. Curriculum mapping holds great benefits for a HEI. The benefits include having a documented programme, avoiding scope creep and aligning the module, unit and programme exit level outcomes (Madiba, 2010, pers. comm. 27 August).

Various recommendations and issues with the current amendment process were made by Dresselhaus (2010, pers. comm. 19 August), Madiba (2010, pers. comm. 19 August), North (2010, pers. comm. 6 May) and Boshoff (2010, pers. comm. 16 August ). The issues and recommendations were respectively as follow:

#### Complaints:

- Populating the necessary data only in the last phase of the process inhibits the flow of the process. By doing this in the early stages of the process will digitization be less painless and possible future errors prevented.
- The programmes need to be mapped for auditing purposes and other purposes alike.
- A gap exists in the assurance that promises and principles are kept and executed throughout the implementation of the programme/module.
- No standardisation of assigning credits across all the Departments at UP.

- The Amendment process is time consuming and thus is it difficult to ensure that all programmes are relevant.
- Lack of capturing the programme delivery.
- No provision made in the PeopleSoft Campus Solution package for this core process.
- Scope creep that occurs when programme is not documented/mapped. Scope creep is a phenomenon that happens when module content is amended or supplemented without considering other modules and their involvement.

Recommendations:

- To map the programmes
- The Education consultant needs to be involved from the conceptual stage of the process.
- It needs to be ensured that all the required work has been performed before it's placed on the Faculty Board agenda for consideration.
- The health of existing programmes/modules needs to be evaluated.
- To use historical data/concepts to aid in the development of new and improved concepts.

Two main role players in the amendment process of the B.Com Internal Auditing, Mrs. Kato Plant, and the B.Admin Public Management, Dr. Liane Malan were consulted. Prof. Yadavalli, the Head of the Industrial Engineering Department as well as Prof. Claasens, previous Head of this Department, were also consulted on the amendment of the B.Eng (Industrial) programme that was made in previous years. Their process and experiences are discussed in section 5.4.6.

\*Research consent forms are provided in Appendix I

\*\*Ethical clearance approval form is provided in Appendix J

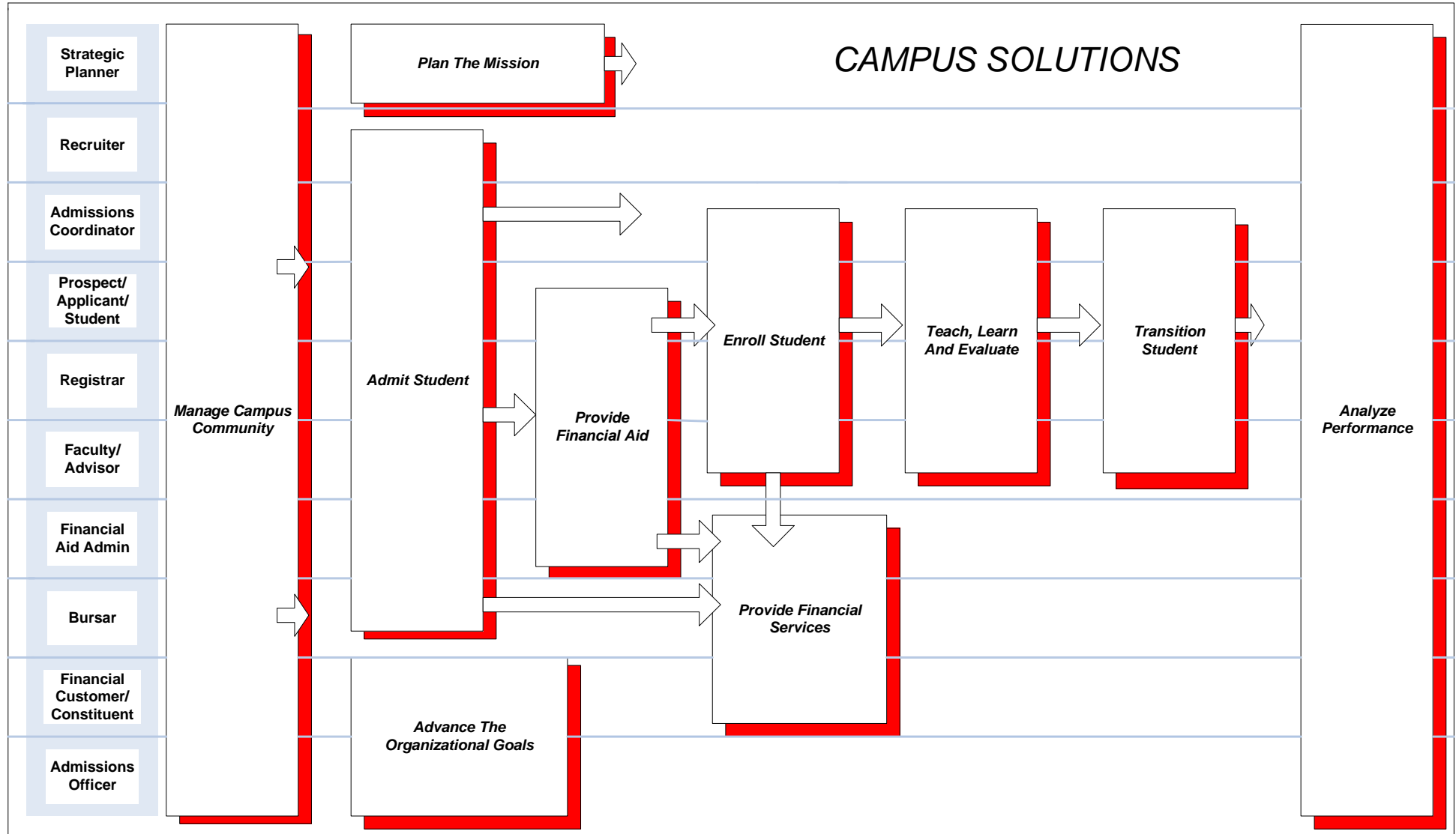


Figure 6: The PeopleSoft Reference Framework for Student Life Cycle (Haywood, 2008).

## **3.2 RESEARCH OBJECTIVES**

### **Objectives at UP include:**

1. To research different process reference frameworks for the student life-cycle end-to-end processes, especially for the development of amendment programmes.
2. To assess the generality of the frameworks in terms of business architecture parameters, such as product, customer type, student type, business objectives etc.
3. To create a method to identify standardisation opportunities for any end-to-end process.
4. To use the supplementary method to create a process map for the Programme Amendment process and to assess the feasibility of standardising, digitizing and replicating this process across multiple units in order to partially validate the method.
5. To establish a best practice process for the Programme Amendment process at the University of Pretoria.

### **Objectives for the course BPJ 410 and BPJ 420 include the following:**

1. Project proposal (due 24 March 2010)
2. Preliminary report (due 12 May 2010)
3. Presentation of the preliminary report (May/June examination period)
4. Draft version (due 24 August)
5. Final Report (due 5 October)
6. Presentation of Final Document (October/November examination period)\*

\* Tentative Dates

## **4. LITERATURE REVIEW**

### **4.1 INTRODUCTION**

This literature review will aim to provide guidelines on the tools and techniques that can be utilized, using best practices, to create solutions for the specific problems in this project. It will be discussed how similar problems were approached and solved in the same environment as this project. This is discussed in sections 4.1.2 and 4.1.4. The applicability of using the TOGAF method for developing an Enterprise Architecture in HE is discussed by means of a case study conducted at KCL. Relevant

background information is given to support the JISC project case study. The new paradigm that was created by Ross *et al* (2006), and the foundation on which this project is based on, is explained in the necessary level of detail in section 4.2. Background information is given on Business Architecture in section 4.3 to support some of the theory discussed. Relevant reference frameworks that can be applied to a student life cycle process at HEI are discussed in section 4.4. One of the aspects involved is a study conducted by Van der Merwe (2005) for finding a reusable high-level process model in HE. Finally, two approaches are explained to aid the identification of process standardisation opportunities in section 4.5.1. Various Business Process Modelling techniques are discussed in section 4.6. The literature review is concluded in section 4.7. A short diagram representing the contents of the literature studied is shown below in Figure 7.

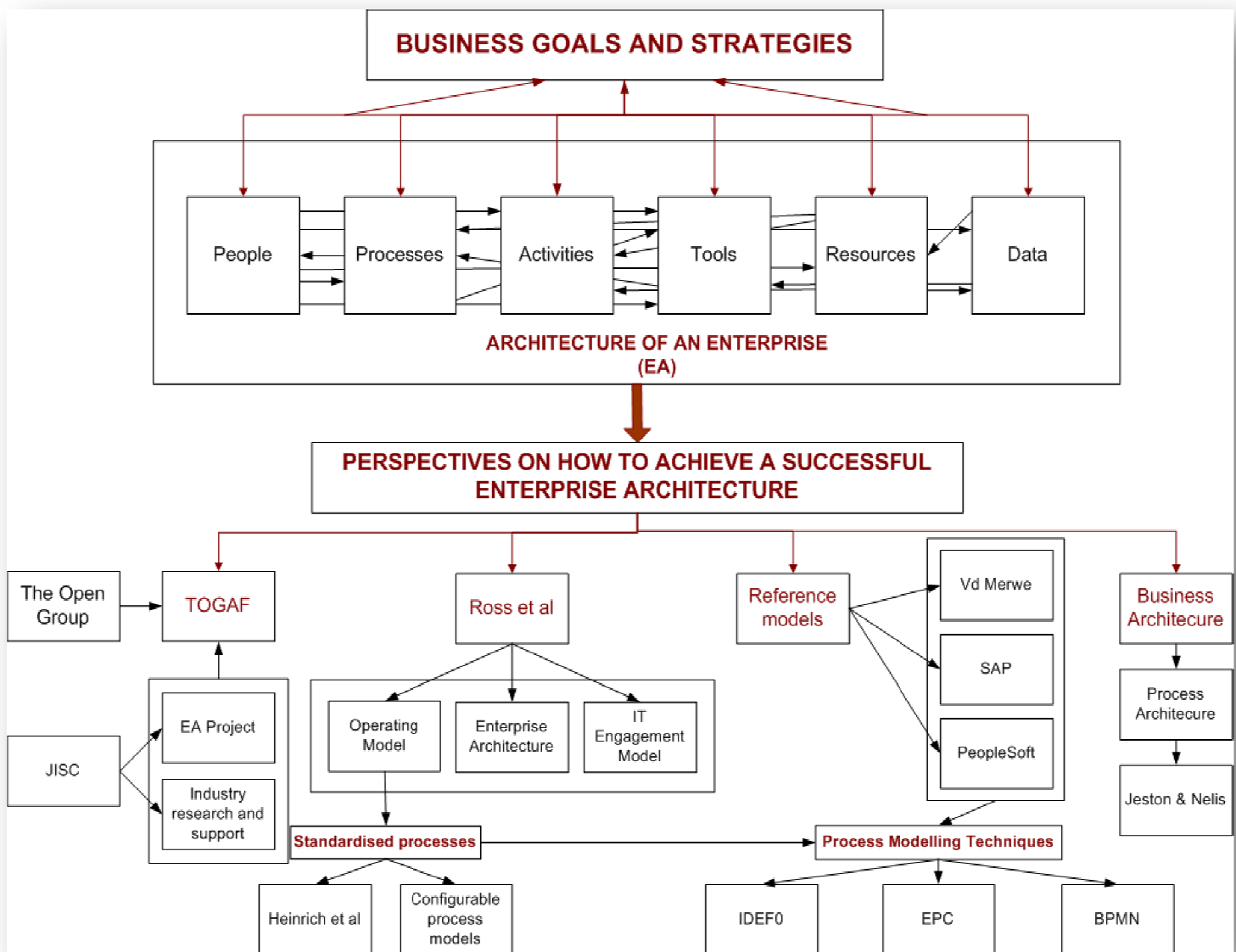


Figure 7: Graphical representation of literature studied



### **4.1.1 Introduction to EA in the context of HE**

A vision is emerging across HEI to create an agile infrastructure that supports organisational goals and IT. This vision was triggered from the argument of Watson (2007) (discussed earlier in section 1.1.6) that HEI should be open to organisational re-thinking to eliminate the silo culture and integrate technology with business strategies and objectives. The question on everyone's minds is if EA can be fruitfully used for Higher and Further Education?

### **4.1.2 Introduction to JISC**

The Joint Information Systems Committee (JISC) was established less than 20 years ago. Within this time, JISC has made a large contribution to UK's educational sector and its competitive advantage. Their position, as part of and working with the education sector, contributed to their success. JISC's purpose is to help higher and further education in the innovative use of technology and to drive institutional change in this sector.

JISC constitutes of a JISC Board and sub-committees. It's members are various academia, senior management and technology experts working for UK's educational sector. JISC programmes are aiding researchers to apply the next generation digital technology by reflecting the current and future needs of the education communities.

Currently, JISC is continuing to explore EA in the education sector. By making all their findings, reports and experienced gained available to HE and FE institutions, are duplicate and thus redundant research by other organisations prevented. Thus saving time and money. Interested EA practitioners can join the JISC EA Practice Group and so aid in making a collaborative attempt in accelerating other EA projects.

#### **4.1.2.1 JISC EA Programme**

In 2008 a pilot EA project was funded by JISC to explore the applicability of EA in Higher Education Institutions. This was done in accordance to the JISC e-Learning Capital Programme, although the scope of EA is much broader than that of e-Learning. The project was initiated by ten universities originally, however only three were considered EA suitable. The three universities that were involved were, Cardiff University, Liverpool John Moores (LJMU) and King's College London (KCL). A fourth university, Roehampton University, joined the programme later that year.

Each of these universities evaluated the EA context of their institutions over 12 months. The project was conducted using the widely used TOGAF framework, which was developed and supported by The Open Group™. This was done as an attempt by JISC to establish a long-term relationship with The Open Group. The pilot project made use of TOGAF 8.1 as this was the most recent version available at the time (JISC, 2009). Funding was given to each institution to participate in TOGAF training, EA workshops and process modelling tools and methods, conferences and Forums held by The Open Group™ and a joint SURF Architecture meeting. This was done to give the relevant members of each institution the sufficient knowledge on EA and the tools and techniques used by TOGAF. Additional support was given by other staff members, a JISC programme manager and an Open Group representative at each institution.

The objectives of the project were to:

- Create quarterly progress reports which contribute to a **longitudinal case study**
- Incorporate **Service Usage Models (SUM)** into the e-Framework: Within the e-Framework, SUM indicate how different services are used to provide one similar function. As SUM can create a link between the business processes and how they work together with technology, SUM's can be incorporated into EA as part of business architecture (BA).
- Deliver **process architecture models**. There are deficiencies with information available about the context of the business processes modelled by the e-framework. Each pilot programme will map the process and architecture models that will help solve such deficiencies.

The pilot project conducted at KCL will be discussed later in this Chapter which constitutes as a case study.

### 4.1.3 Introduction to The Open Group™

The Open Group™ is a non-for-profit organisation with offices and members from around the globe. It is a vendor and technical neutral consortium whose vision and mission is to “allow access to integrated information within and between enterprises based upon standards and global interoperability” (The Open Group, 2010, p. 1). With over 20 years of experience, this organisation provides services which include strategy, management, innovation and research, standards, certification and test development. Members of this organisation benefit from shared information on academic research breakthroughs and relevant events. The Open Group™ concentrates on developing best-practices and standards in EA and their Boundaryless Information Flow concept (JISC, 2009).

#### 4.1.3.1 The Open Group Architecture Framework (TOGAF)

The Open Group Architectural Framework's roots came from the Technical Architecture Framework for Information Management (TAFIM). The TAFIM framework was developed by the US Department of Defence, in accordance to the influence of the Zachman Framework. The Open Group refined this TAFIM framework into what is known today as the TOGAF framework (Josey, 2009).

TOGAF is defined by JISC (2009) as a non-proprietary generic architecture development framework, supported by best-practices. TOGAF provides guidance to which a set of generic deliverables, produced by building an enterprise architecture, can be achieved. TOGAF distinguishes itself from other frameworks through the method (Josey, 2009). According to JISC (2009), other frameworks focus on the specific deliverables that needs to be achieved and not the actual process that is required. This method of achieving deliverables is known as the TOGAF Architecture Development Method (ADM). TOGAF ADM is capable of producing and complimenting any deliverables from other EA Frameworks (Josey, 2009).

TOGAF supports the four types of architectures namely, Business Architecture, Data Architecture, Applications Architecture and Technology Architecture. These Architectures as defined by TOGAF 9 are discussed in section 1.1.4.

TOGAF ADM is considered the most important facet of TOGAF, with two other elements supporting ADM. The support elements are the Enterprise Continuum and Resource Base. The ADM indicates how to build an organisation specific enterprise architecture that attends to the business requirements. It provides numerous tools and techniques that is essential for the application of this framework together with guidelines on how to adapt to real-life scenario's (Josey, 2009). ADM consists of a number of phases, which are depicted in Figure 8. Each phase is discussed in detail with objectives, inputs and outputs for each individual phase. The intricate details of all these elements and phases are beyond the scope of this document.

The Open Group™ has certification rights to award to professionals in the use of TOGAF ADM. This certification was the first of its kind, which defines the standards for measuring performance of IT architect experts and practices (The Open Group, 2010).

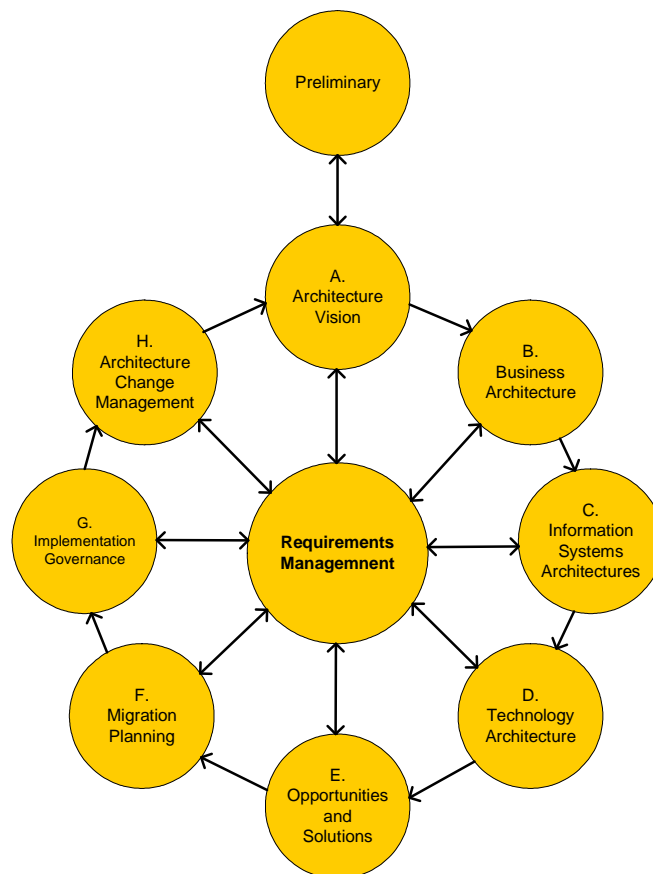


Figure 8: The TOGAF ADM's phases (The Open Group, 2010, p.81)

#### 4.1.4 Case study: KCL Enterprise Architecture Project

The King's College Enterprise Architecture Project (KEAP) evaluated and 'road-tested' the application and relevance of the TOGAF 8.1 framework in the context of HEI, as part of the JISC EA Pilot programme. Although the KEAP project was more

focussed on the research domain, it still acted as a measure for the relevance of applying EA approaches in HE.

### **Background**

The KEAP project was carried-out in support of their strategic plan for 2006-2016. The strategic plan involved the development of all the Information Systems and IT infrastructures over a period of 5 years. The complexity and the large number of stakeholders made an architectural approach inevitable (Hedges, 2009).

### **Benefits of this Case Study**

The KEAP project conducted at this college will aid other HEI when applying EA. According to Hedges (2009), there is very limited information available on the practical application of EA or TOGAF in such institutions currently. This case study will attempt to fill the gap between the applications of EA or TOGAF in HE. However, Hedges (2009) states that other studies with a longer time period may be more valuable, as this project only covered a 12 month period and that there was not sufficient time to evaluate EA comprehensively.

KCL experienced the application of EA as a fruitful one. EA can hold a wide range of benefits for a HEI. However, Hedges (2009) did make some comments on the complications of TOGAF and EA, which included:

- A more generic, less heavyweight, concrete and constructive approach to EA will pose greater value to HEI.
- Support and input from higher/top management are essential to successfully apply EA throughout the institution.
- Adequate training is necessary for the people involved, prior to the start of the project.
- TOGAF training was not particularly useful, although it provided a broad framework and vocabulary. Courses were more business-orientated, lacking practical application in HE examples.

## **4.2 EA AS STRATEGY BY ROSS, WEILL AND ROBERTSON (2006).**

This project's research methodology follows the Enterprise Architecture paradigm for creating value that was created by Ross *et al* (2006). This paradigm entails that organisations should identify their core business processes, and digitize them. This is encapsulated in their foundation for execution. Ross *et al* (2006) argue that companies that have a foundation for execution perform better than others. Although the foundation of execution mostly refers to companies, it is stated that it is equally relevant to not-for-profit institutions (Ross *et al*, 2006).

Three facets must be mastered in order to build an effective foundation for execution: The Operating Model, Enterprise Architecture and the IT Engagement Model (Ross *et al*, 2006). These facets of the foundation will be discussed below.

### **4.2.1 Defining the Operating Model**

The OM defines the necessary level of business process standardisation and data integration to best support the organisation's strategic goals. It entails what strategies are going to be supported when decisions need to be made. As this is the first step in building the foundation for execution, it is a critical component.

As discussed in section 1.1.6, are there two dimensions involved in an OM namely, Standardisation and Integration. Four types of Operating Models describe the levels of standardisation and integration of the business processes. These types are Diversification, Coordination, Unification and Replication.

#### **4.2.1.1 Standardisation and Integration**

Standardisation is classified by Ross *et al* (2006) as the exact means by which a process is executed, regardless by whom and where. Variability in different processes is reduced by standardising the processes.

Integration links various organisational units through the data that is shared amongst them. This requires consistent definitions and data formats for all the organisational units however, data integration will create increased agility, efficiency and transparency (Ross *et al*, 2006).

#### **4.2.1.2 Four types of Operating Models**

The four types of OM are: Diversification, Coordination, Replication and Unification. Each of these models can be seen in figure 2 in section 1.1.5. The figure depicts the different levels of standardisation and integration involved in each type.

### **4.2.2 Enterprise Architecture**

An Enterprise Architecture is necessary to supplement the detail given in the Operating Model. As the OM only gives a broad direction of the company, is the detail of the OM insufficient when more guidance is required. An Enterprise Architecture Comprises of the key processes, systems and data of the business core processes. Ross *et al* (2006: p.47) state that “Enterprise Architecture directs the digitization of the foundation for execution”.

Ross *et al* (2006) describe this enterprise architecture the reflection of the level of standardisation and integration defined in the OM, via the organising logic for the processes and IT infrastructure.

It is argued that previous EA attempts focussed on the as-is and future state capabilities, which diverged the focus from what really matters. The identification of processes, technologies, data and customer interfaces that transforms the OM into reality, is the solution to successful EA. By capturing the important aspects of the defined OM into the company’s enterprise architecture, improves the foundation for execution. (Ross *et al*, 2006).

#### **4.2.2.1 Core Diagram**

A core diagram encapsulates the architecture of an enterprise in a similar manner as to how the blueprints of a building represents it’s architecture. It is a holistic picture representing the processes, data and technologies required for the desired foundation for execution (Ross *et al*, 2006).

A core diagram constitutes of four elements in an enterprise architecture:

- *Core business processes*  
The core business processes are defined to be the key capabilities in order to execute the OM and respond to market opportunities.

- *Shared data driving core processes*  
These are the data required for the core business processes.
- *Key linking and automation technologies*  
These include 'middleware' and major software packages, portals providing access to data/systems and interfaces.
- *Key customers*  
These are the main customer groups served by the core diagram.

#### 4.2.2.2 Stages of EA Maturity

When navigating the way through the different levels of architecture maturity, businesses identify where it will be most beneficial to synergize than being autonomous. Organisations go through four stages of EA maturity, starting from Business Silo's and working through to Business Modularity.

##### *Business Silo's*

This is the most primitive maturity. Here businesses focus on local problems and opportunities. An established set of technology standards are not present and businesses do not rely on these standards. The Silo Culture plays the role of establishing which IT capabilities are required for automating specific processes. An application is usually bought or developed to meet these required IT capabilities (Ross et al, 2006).

##### *Standardized Technology*

Some shared infrastructure is used at this stage of maturity. Technology standards are established to lower the platforms. The cost effectiveness and reliability is considered the areas of concern (Ross et al, 2006).

##### *Optimized Core*

The shift has been from applications and shared infrastructure locally, to enterprise-wide. Interfaces are developed and processes standardized (Ross et al, 2006).

##### *Business Modularity*

This is the most difficult stage to achieve, and very few companies do. Strategic agility is created through creating customized and reusable models. The digitized processes from the preceding stage are modularized and refined by management (Ross et al, 2006).

### 4.2.3 IT Engagement Model

The IT Engagement Model is described as the engagement of key stakeholders, implementation and new IT process capabilities. Ross *et al* (2006:pp.118-119) define the IT Engagement model as "the system of governance mechanisms assuring that business and IT projects achieve both local and company-wide objectives". This model consists of three main components. These are:

- *Company-wide IT Governance:*  
The behaviour of IT is controlled by the usage of decision rights and accountability frameworks

- *Project Management:*  
The deliverables and time-schedules with check-points are formalized in a project methodology
- *Linking mechanisms:*  
The project activities are linked to the overall IT Governance and incentives are aligned.

### 4.3 INTRODUCTION TO BUSINESS ARCHITECTURE

Business Architecture (BA) can be defined as “the grouping of business functions and related objects into clusters/business domains over which meaningful accountability can be taken, as depicted in high-level description of related business processes”, (Versteeg & Bouwman, 2006, p. 93).

The business domains are the main elements of a BA. It entails that the most important business functions such as marketing’s or manufacturing’s responsibilities are arranged into clusters/areas of accountability. BA provides the holistic description of how these domains are dealt with, (Versteeg & Bouwman, 2006).

BA defines the connection between business processes, their roles, behaviours and information and the business strategies of an organisation. It is commonly used in numerous applications such as modelling approaches, frameworks and software suppliers. There is however a lack of effective BA in organizations, as technical architectures are more commonly used”, (Versteeg & Bouwman, 2006).

Nowadays, companies build business process models instead of business strategies. A good BA consists of business process models which describes the concerning process entity in relation to the organizational view of the enterprise. According to Versteeg & Bouwman (2006) are the building blocks of a BA, business modelling.

Versteeg & Bouwman (2006) make the distinction between EA and BA in the architecture’ scope. An Enterprise Architecture scope is enterprise-wide. Whereas that of a BA is the structuring of the responsibilities of different business activities within only a part of an enterprise or one/many enterprises.

The main objective is to consider the holistic view of a business and its business architecture when considering process standardisation and digitisation.

### 4.4 FRAMEWORK REFERENCE MODELS

The art of doing successful EA in an organisation might be an overwhelming task, and doesn’t come easy. Various frameworks and methodologies were developed by organisations for this reason (JISC, 2009).

Currently only a few process reference frameworks exist for a Higher Education Institution’s core processes. Some of the available reference models will be discussed in this section.

#### 4.4.1 A high-level process model framework for HEI

A research study was conducted by Van der Merwe (2005) to develop a reusable process model for HEI. This study proved the hypothesis that is it possible to have a

reusable process model to encapsulate the high-level process (main processes) in a HEI. Three institutions were used for the hypothesis of the study and the conclusions were confirmed by a fourth institution. Van der Merwe (2005) stated that although some similarities exist between the activities in the business world and the academic environment, such as finances and human resources. However, the HE environment requires some sets of processes that are essential to work together in order to provide a better learning experience for the student. This is unique to the HE environment and includes processes such as New Course Development and Student Registration (Van der Merwe, 2005).

The three primary institutions that were used included, The University of South Africa, The University of Pretoria and Tshwane University of Technology (TUT). As the generic framework was developed in accordance to UP's core processes, it may be a useful framework to consider in this study.

Van der Merwe (2005) explained that a process can be defined as generic when it consists of a repeating nature and when it can be applied to any member of a group.

The respective role players and products that needs to be considered in the core processes were identified. The role players were categorized into the lecturing, administrative, support and management staff. Groups that were described as 'other' represented role players that could not be categorized in any of the other groups. The products delivered by UNISA, were graduation degrees, published research, course materials and the developed commercial products. Most of these products may also be applicable to UP, but more detailed investigation will be required to support the assumption (Van der Merwe, 2005).

When the generic process model was developed, the primary processes were linked with one another through the input and output resources. The relationships between each process were also established. Eight processes were identified for the high-level process model. The eight processes were: Reflective Research, Course Development, Registration, Assessment, Production, Distribution, Student System and Academic Student Support. See Figure 9 for a graphical representation of the high-level process model (Van der Merwe, 2005).



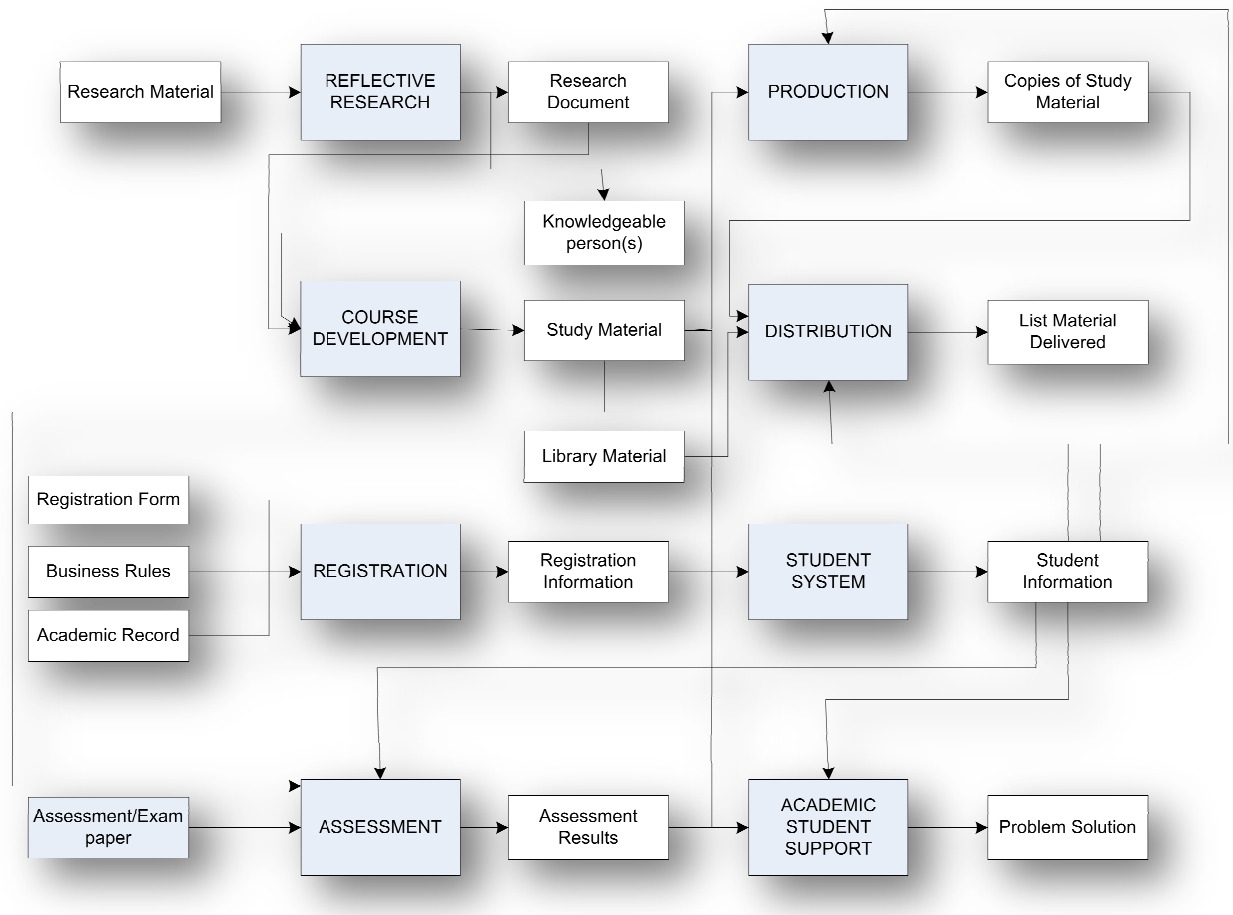


Figure 9: The high level process model (Van der Merwe, 2005, P.182).

Unfortunately, only the Registration Process was redefined in the study of Van der Merwe (2005). The Registration Process is not included in the scope of this project and therefore not applicable however, the high-level process model that was developed could pose some advantage for this project as the process for the development of new courses (Course Development Process) was included.

#### 4.4.2 The SAP Reference Model

The Systemanalyse und Programmentwicklung (SAP), or translated in English as the System Analysis and Program Development reference model was established in 1972. Situated in Germany and with offices in over 50 countries world wide, SAP is the world's largest business software company (SAP, 2010).

The SAP reference model consists of a set of information models, each with the aim of guiding the implementation and configuration of the SAP systems. All the business process models within these information models are modelled in the EPC notation. The SAP reference model consists of almost 10 000 individual business process models. SAP's reference models provide the blueprint on how to modify existing business processes and their process models are considered as best-practices (Mendling et al, 2006).

The SAP Higher Education solutions map is a reference model for the core business processes within the value chain of a Higher Education Institution and consists of; Institutional Development, Student Lifecycle Management, Academic Services and Learning and Student Services. These processes and their relation to the Higher

Education reference model can be seen in Figure 10 below. Figure 11 indicates the elements of the Academic Services and Learning process. It is apparent in this figure that this process makes provision for processes for programme developments, approvals and programme amendments or other processes alike.

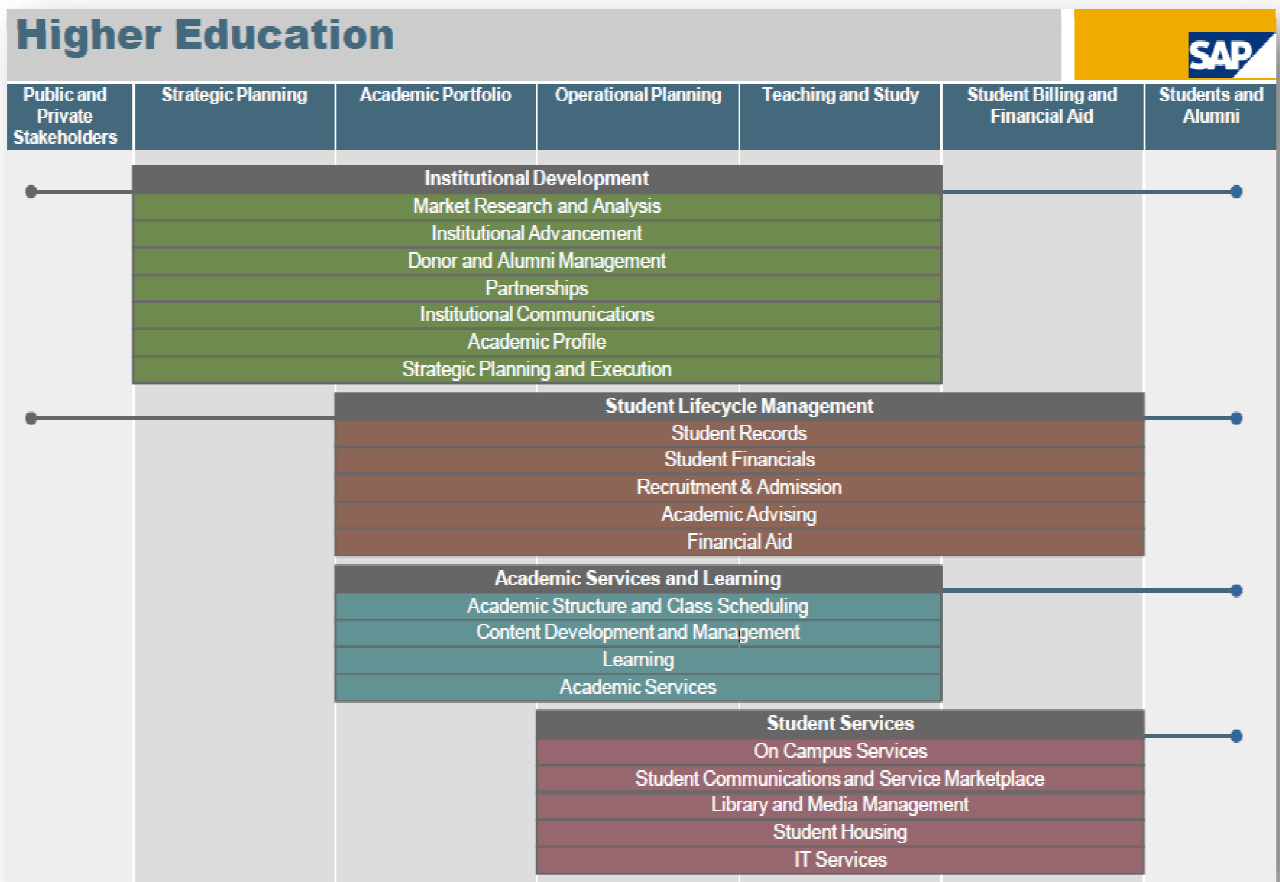


Figure 10: The Value Chain of a Higher Education Institution (SAP, 2010).

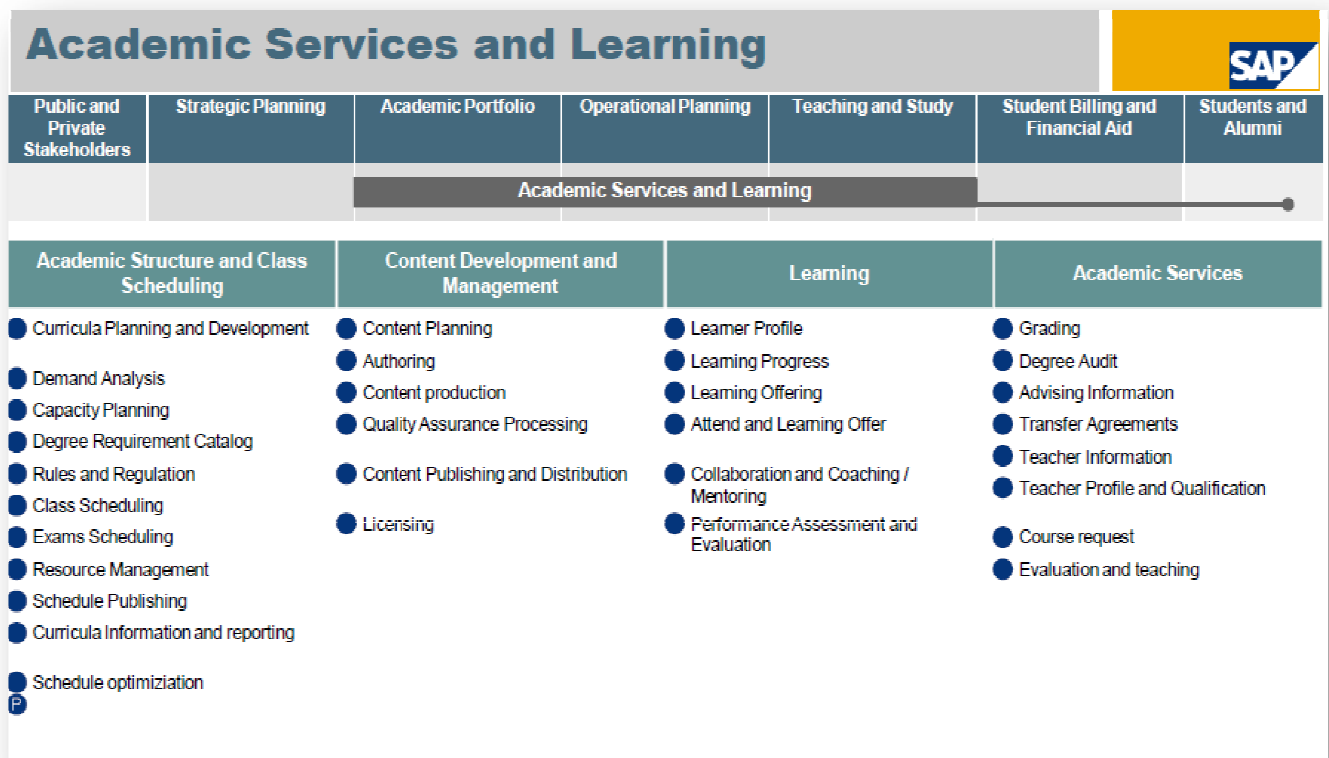


Figure 11: The elements of the Academic Services and Learning Process (SAP, 2010).

### 4.4.3 A method developed by Jeston & Nelis (2006)

Jeston & Nelis (2006) state that the foundation for process-related projects are the process architecture. Moreover, a good process architecture is an essential component of an enterprise architecture. It is necessary to align a process architecture with business strategy, objectives, and the business and IT architectures. A good process architecture ensures that:

- Any newly developed or re-designed processes are aligned with business strategy and meets the demands.
- The processes are aligned with IT applications and architecture, as IT has to support the future and current processes
- The processes are comprehensive and understandable.

It is also argued by Jeston & Nelis (2006) that companies without a stated business architecture are not as capable to present solutions in a comprehensive and understandable architecture as companies that do. Jeston & Nelis (2006) describe a process model as the representation of the high-level processes and the links between them. Although the methods and tools explained are mostly focused on process architecture, is it also relevant for enterprise architecture.

The method for developing a process architecture comprises of seven steps. The steps will be briefly discussed (Jeston & Nelis, 2006, pp. 86-98).

#### *Step 1: Obtain strategy and business information*

To be able to provide solutions that fit the business logic is it important to understand the fundamentals of the business. In order to accomplish this, is implicit principles and logic as well as explicit principles logic required. The relevant high-level information regarding these principles and logic must then be captured. This information includes, products and services, customers, pricing and discounting and partners and distributors (Jeston & Nelis, 2006).

#### *Step 2: Obtain process guidelines and models*

The following are essential to obtain in this step:

- Process guidelines
- Process models
- List of the End-to-End processes

The process guidelines include the process owners, the scope of the process architecture, the modelling methods and tools to be used, the process governance policies and the relevant reference models to be used.

The process models entail an organisation view of all the core, support and strategic processes together with the concerning End-to-End process. The End-to-End process can include the effort, the number of staff, the cost savings or the transaction volumes involved by each process/sub-process (Jeston & Nelis, 2006).

#### *Step 3: Obtain relevant information and technology principles and models*

This step requires that due care must be taken that the IT infrastructure supports the business architecture, when the development of the IT architecture precedes the development of business architecture. The networks, platforms, data models,

middleware and the applications and their interfaces are necessary to be obtained in this step (Jeston & Nelis, 2006).

*Step 4: Consolidate and validate*

Here is the consistency in the process architecture key. Conflicting priorities must be taken into consideration and consolidated (Jeston & Nelis, 2006).

*Step 5: Communications*

The relevant persons must be informed on the process architecture. This can be achieved by creating posters, process models and by charts/projects using the architecture in the scope and decision making (Jeston & Nelis, 2006).

*Step 6: Application*

In order to implement the architecture is strict discipline required. Future projects and decisions must consider the architecture and deviations must be stated and only employed when full justification can be given (Jeston & Nelis, 2006).

*Step 7: Continuous improvement*

The process architecture must be continually updated and a change management mechanism employed, to deal with future changes in the architecture. The current architecture can also be further refined or the scope can be widened (Jeston & Nelis, 2006).

## **4.5 METHODS TO IDENTIFY STANDARDISATION OPPORTUNITIES**

Ross *et al* (2006) discuss the standardisation and integration of the core business processes in the OM, however, this is a tedious and difficult task to perform. There is a lack of appropriate mechanisms to guide the standardisation of processes and identification of shared business services (Heinrich *et al*, 2007). Two methods are discussed in this section which may provide meaningful guidance for process standardisation.

### **4.5.1 A method by Heinrich *et al* (2007)**

The process map can depict as much of the processes of an enterprise or a division in a systematic way. The completeness of the process is defined by an End-to-End process representation, where the process is mapped from its initiation to its completion. Process maps are used extensively in the industry to improve on the efficiency of operational procedures by reducing the costs and increasing flexibility for future demands. This tool lowers the costs by reducing or eliminating the process variants through standardization. It is essential to identify similar or identical functions in order to standardise them (Heinrich *et al*, 2007).

The primary functions of different processes are mostly the same. Variants are created for three reasons as stated by Heinrich *et al* (2007). These variants are dependent on the customer groups, the access channels and the executing organisational units. It is argued that the reasons why process variants exist, are because processes were historically grown together with the range of different responsible agents for the procedures. Existing processes were not considered in the development of new processes. This emphasises the importance of having

complete and consistent documented process maps. This will prevent new process variants from arising from future processes (Heinrich *et al*, 2007).

It is most important for the process map to support the identification of similar processes, sub-processes or functions. Heinrich *et al* (2007) differentiated between functional and structural similarities. It is defined that structural similarities is the conformance of processes by their structure, hence by means of their utilization of identical model elements (procedures). Functional similarities are defined by the conformance of the different process functions, in other words if equivalent results are given even when different procedures are used to deliver these (Heinrich *et al*, 2007).

It is necessary to make this differentiation between functional and structural similarities, as functional similarities indicate opportunities for process standardisation whereas the structural similarities are used to design the process map (Heinrich *et al*, 2007).

According to a Heinrich *et al* (2007) are possible standardisation opportunities realised with much difficulty when the abstract modelling of processes is used. It is therefore necessary to refine the processes to its different levels of detail in a consistent way. Unambiguous design principles are used for this refinement, which are:

- Aggregation/disaggregation relations: This relation describes the detailed part of which the level is derived from.
- Generalisation/specialisation relations: This relation generalises or specialises the instance of the attributes.

Heinrich *et al* (2007) applied this tool, the process map, at a Financial Service Provider to demonstrate how to develop a process map and how this tool can be helpful in identifying opportunities for process standardisation and shared business services.

### **Development of a Process Map**

A representation of the End-to-End process did not exist. Therefore generic sub-processes were identified to structure the processes. These generic sub-processes that were identified were: Analyse customer demand, product specific consultation, close contract/order, handle contract/transaction and book transaction. These can be seen in the Figure 12 in the horizontal plane.

For the second dimension, the product group object was found eligible as there seemed to be large variants in the process group processes and possibilities for standardization proved to be promising. Figure 12 depicts this first level of the process map. Note that the different organisational units are indicated in the figure as well.

The aggregation/disaggregation and generalisation/specialisation relations techniques are used to refine level two. The generic sub-processes are decomposed into smaller processes and the product group field is specialised into the different products. Some differences in the current End-to-End process could already be identified. A part of the constructed level two can be seen in Figure 13.

Level three was constructed by decomposing the generic sub-processes even further and taking the access channel product object into further consideration.

Only the access channel was considered, because the individual products could not be specialised in more detail

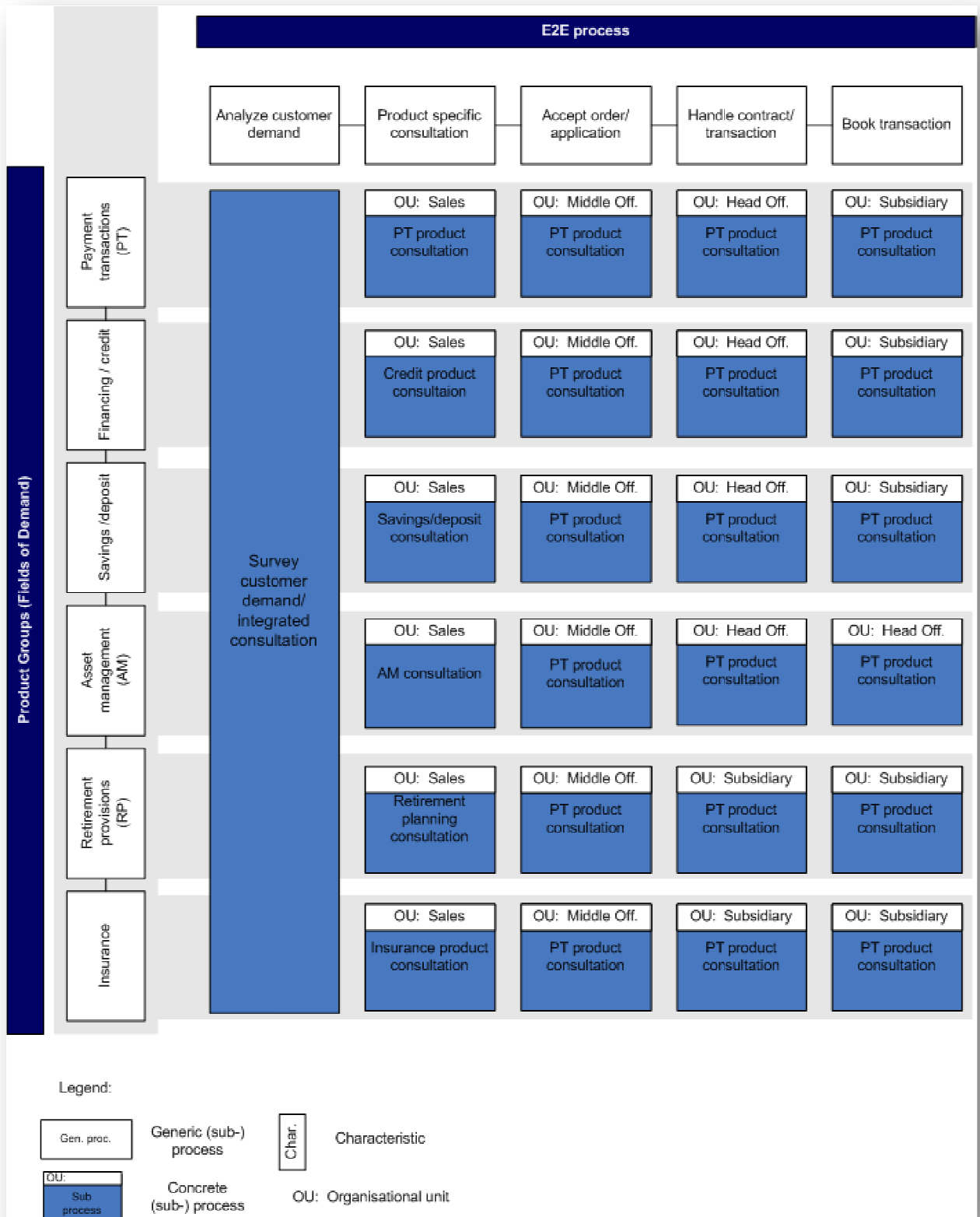


Figure 12: First level process map (Heinrich et al, 2007, p.95)

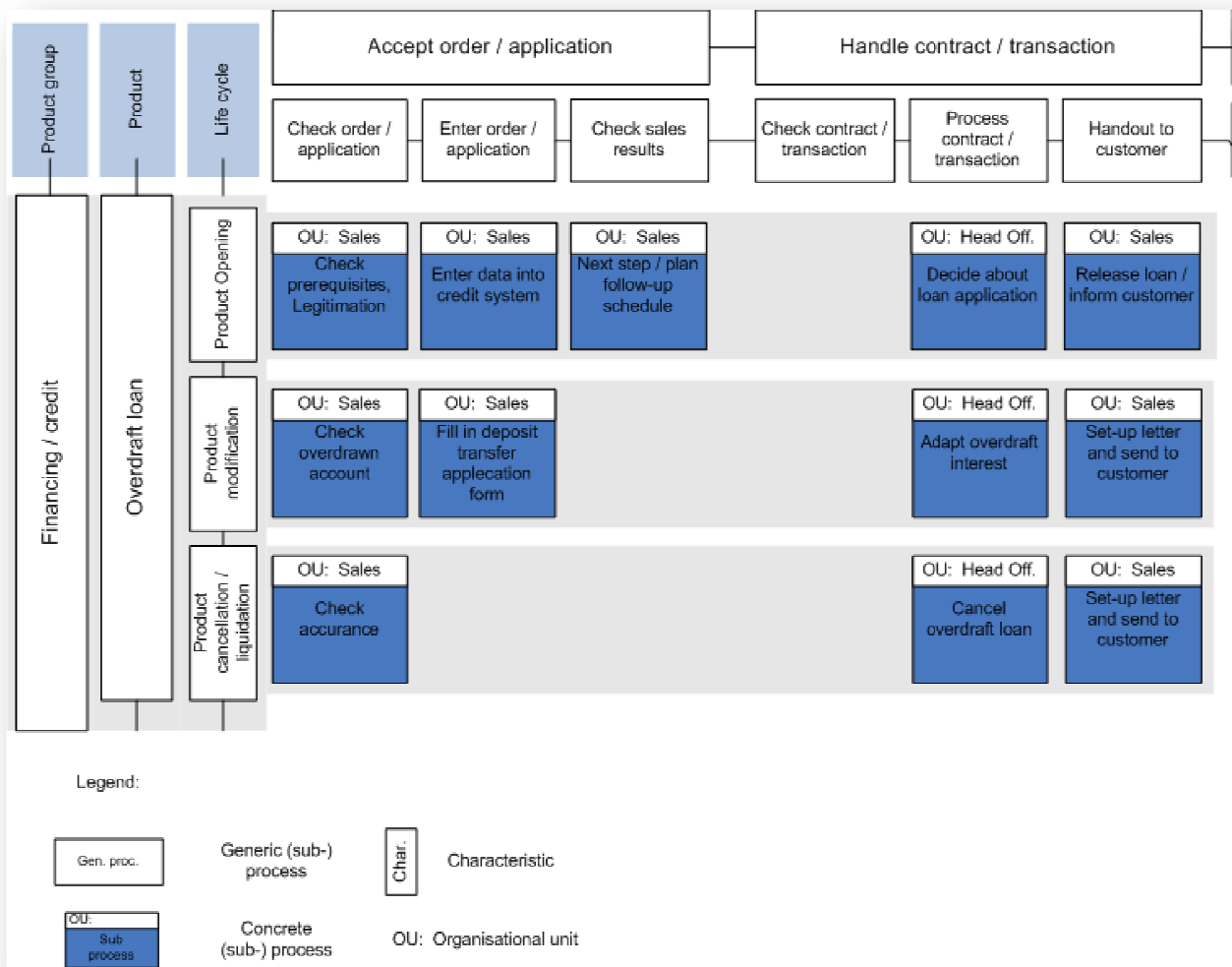


Figure 13: Second level process map (Heinrich *et al*, 2007, p.96).

### Standardising the process variants

With the aid of the process map and the detail it contained, it was possible to identify the differences and to ask the question of why these differences exist. The functional similarities could also be identified for the different products' various processes. Where variants could not be justified, opportunities for standardisation existed. Figure 14 indicates which opportunities for standardising different processes was identified in the stock order and deposit transfer processes.

### To Conclude:

Process maps provide systematic analysis of variants of the processes. It indicates the communication between the processes as well as an overview of all the processes. A process map does not only create opportunity to compare the processes for similar products, but also the processes of quite different products/services.

The objectives of a process map are:

- To support the identification of similar functions
- To represent the complete End-to-End process
- To contain different levels of detail

- To define aggregation/disaggregation and generalisation/specialisation relations

When a case study was conducted at the FSP, it was found that 90% of all the processes could be decomposed into a set of generic sub-processes. This showed great potential for standardising opportunities. These sub-processes were refined with the aid of aggregation/disaggregation and generalization/specialization relations. Processes with similar inputs and similar outputs indicated that the same primary function has to be delivered, which indicated opportunities for standardisation.

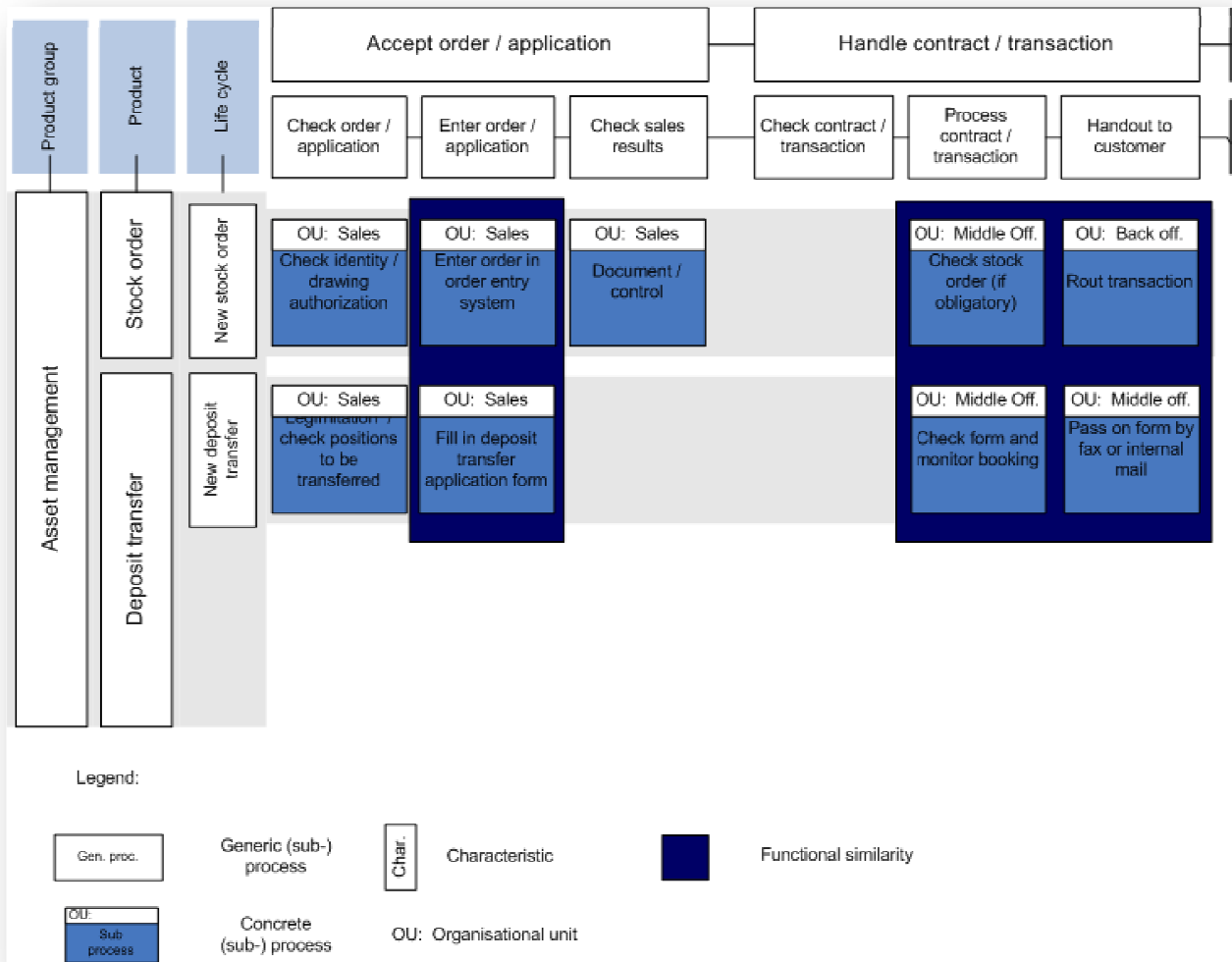


Figure 14: The comparison of process stock order and deposit transfer (Heinrich et al, 2007, p.98)

#### 4.5.2 Configurable Process Models (La Rosa & Dumas, 2008)

Business processes across different business units of the same organisation often serve a similar function. However, these processes are somehow different. Competitive differentiation and requirements are often responsible for standardisation efforts to fail. Configurable process models made it possible to have a standardised process framework for business processes while allowing variation to differentiate processes. The methodology developed by La Rosa & Dumas (2008) was originally based on an extension of the EPC notation, an initiative by Rosemann & van der Aalst (2007). This idea of a configurable EPC (C-EPC) was



later developed into a BPMN model, namely configurable process models by La Rosa and Dumas (2008).

It was suggested to use configurable gateways to indicate various variation points. These gateways are not based on data values available at runtime like the regular gateways, but represents a choice that needs to be made by the analyst. The choice is a design decision and adopts the configurable process model to the specific need of the process, thus configuring the process model into an individualised process model. Configurable activities and gateways are graphically indicated by a thicker/bold border with the exception of the end events .

The use of configurable process models is illustrated by two different processes in the film industry. Screen post-production can be shot on tape or on film. These processes have some similarities as well as differences. The online edit is a cheap editing procedure while negmatching produces better quality and is more expensive. Thus, a budget decision needs to be made to individualise the configurable process models. Figure 16 below indicates the two post-production procedures. The configurable process model in Figure 15 combines the two processes with the configurable gateway indicating the variation.

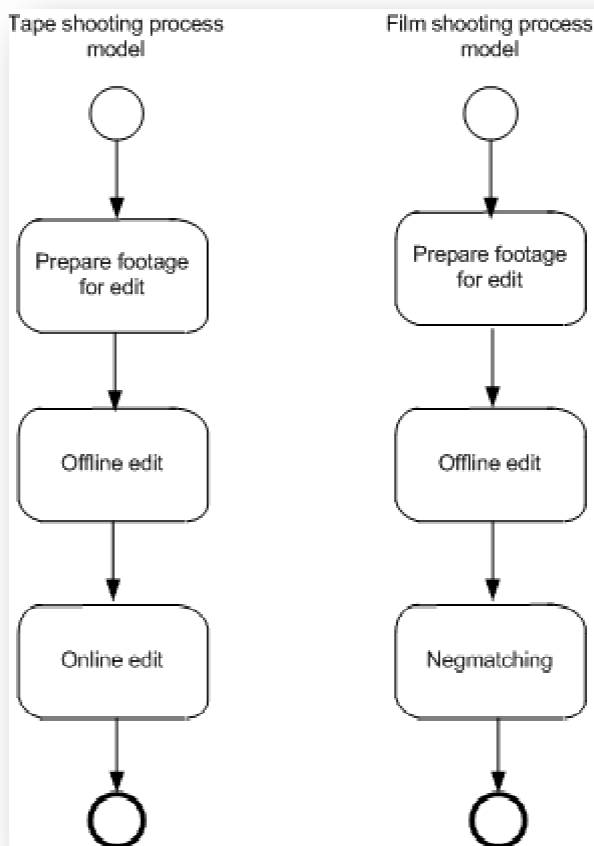


Figure 16: Two individual post-production process models (La Rosa et al, 2008).

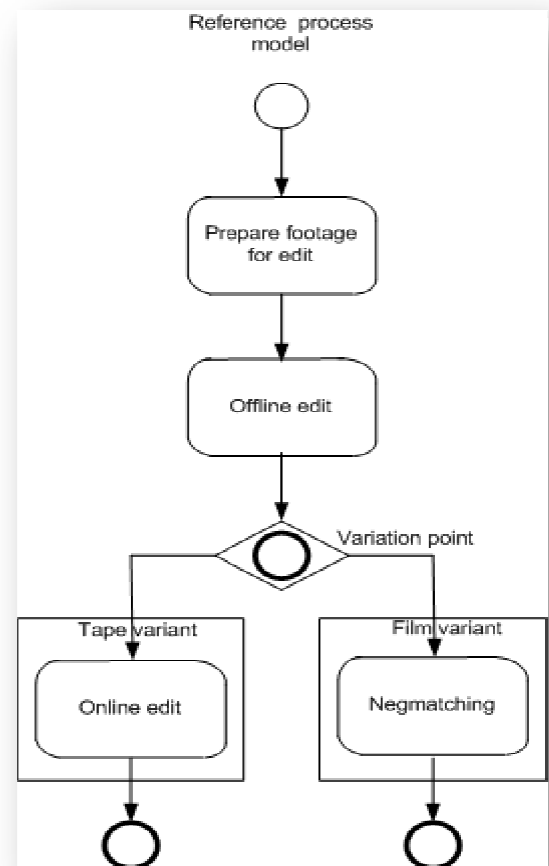


Figure 15: Configurable process model for post-production processes (La Rosa, 2008).

When dealing with a complex process with numerous variation points, the configuration process may become complex and error-prone. La Rosa & Dumas (2008) therefore recommended a decision support tool to prevent possible errors from occurring. It is also argued that the questionnaire will make a complex process model more understandable for non-skilled users. The questionnaire is used to introduce reason to the variation and associate this to the variation points by means of artefacts. The answers provided by the user to the questions provided will determine the configuration of the process. To illustrate this, the question that will be asked for the variation point in figure 16, will be 'what is the type of budget, low or high?'. When the answer is 'high', the process will be configured using the negmatching option and the online edit activity will be irrelevant. Figure 17 is an extract from a questionnaire for the postproduction process.

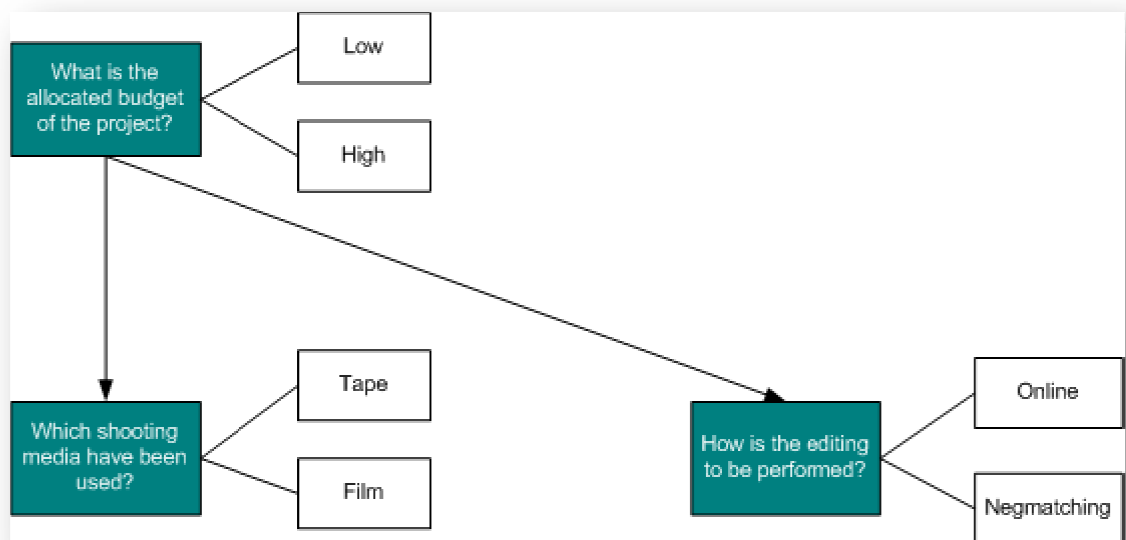


Figure 17: Questionnaire for postproduction (La Rosa & Dumas, 2008).

The idea of a questionnaire does not guarantee a perfect individualised model. Semantic and structure errors may still occur and need to be fixed manually. The correctness of the individualised model needs to be investigated for the process to be complete. This issue is addressed by La Rosa & Dumas (2008) by combining process and domain constraints in the questionnaire. When a unified set of constraints is satisfied, the answer is accepted. If the answer is denied, an additional set of variation points need to be configured simultaneously to assure process correctness.

## 4.6 PROCESS MODELLING TECHNIQUES

In today's competitive business environment, Business Process Management (BPM) has become a priority. Various Business Process Modelling techniques developed from these substantial investments made to develop BPM (Green *et al*, 2010). The Business Process Model is defined by White (2004), as a network of graphical objects or activities with flow controls that defines the order of performance. Various modelling notations were developed, ranging from the most

straightforward models such as Flow Charts to much more complex and expressional variants of the Petri Nets (Green *et al*, 2010).

In this section three Business Process Modelling notations are discussed in an attempt to discover the best-practice for the purpose of this project. This was done by describing the notations and comparing their strong and weak areas. Section 4.6.1 describes the Event-driven Process Chains, while the Integrated Definition Model and the Business Process Modelling Notation are discussed in sections 4.6.2 and 4.6.3 respectively.

#### **4.6.1 Event-driven Process Chains**

The Event-driven Process Chain (EPC), is used for the modelling, analysing and redesigning of business processes. EPCs have been developed within the ARIS framework to model business processes (Ferdian, 2001). This framework was developed in 1992 in Germany with the aim to structure an enterprise by reorganising the business processes. It divides an enterprise architecture into five different views namely the organisational, functional, control, output and input view. The EPC modelling tool was developed under the ARIS framework's control view (Enterprise Architecture, 2009).

EPCs make use of graphical symbols to indicate the control flow structure of business processes as a chain of events and functions. The EPC notation consists of functions, events and logical connectors. According to Ferdian (2001) and Hommes (2004), the strength of notation lies in the simplicity and easy-to-understand notation, which has made this tool an acceptable standard for the modelling of business processes. EPCs enjoy support from various successful commercial tools such as Microsoft Visio, IDS Scheer's ARIS toolset and BOC's ADONIS (Enterprise Architecture, 2009).

##### **Criticisms on EPCs**

Criticism of the EPC notation according to Ferdian (2001) include:

- Ambiguity of start and end events. The confusion with these events arise when there are intermediate start or end events in the middle of the process. This situation is not explicitly modelled in EPC.
- Ambiguity with the use of the XOR (Exclusive Or) and OR logical connectors.

##### **Compliments of EPCs**

The following aspects of the EPC notation are perceived by Ferdian (2001), Enterprise Architecture (2009) and Hommes (2004) to be its strengths:

- Simplicity of elements which makes notation easy to understand.
- Support provided by a variety of tool vendors.

#### **4.6.2 Integrated Definition Models**

The Integrated Definition Models, more in particular the IDEF0 method stems from the Structured Analysis and Design Technique (SADT). This technique is a diagrammatic notation for sketching applications of businesses. The notation makes use of boxes to represent entities and activities whilst arrows are used to relate these boxes. There are two types of boxes namely, data and activity boxes in the IDEF0 model. This IDEF0 model depicts the constraints, resources, inputs and

outputs of each activity/entity together with the respective relations to other activities/entities, which is shown in the Figure 18.

A diagram can consist of up to six boxes, each with its own respective diagram. A parent activity is a representation of the high level process which is then divided into sub-activities. This method leads to a hierarchy in the processes and activities.

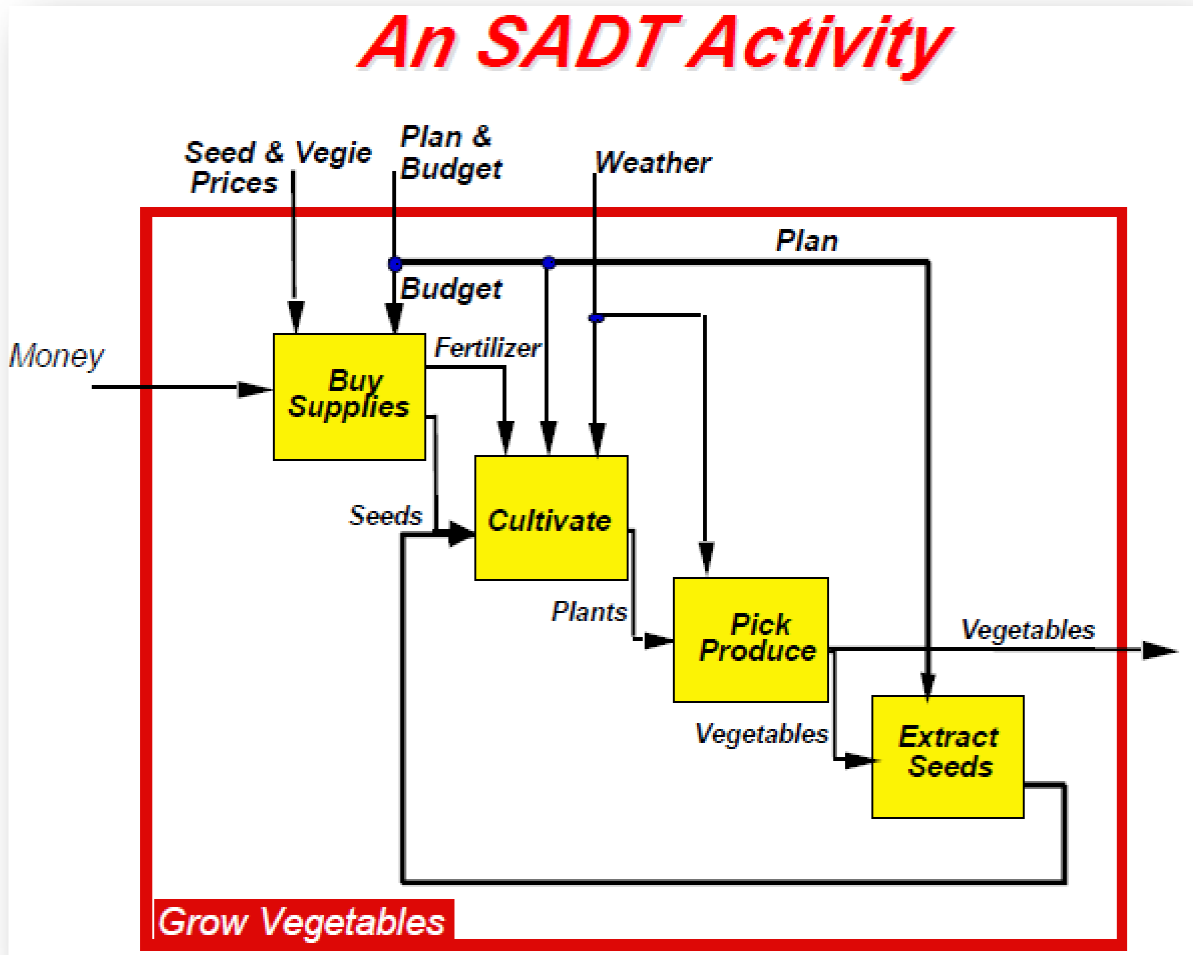


Figure 18: An SADT activity of Grow Vegetables (SADT, 2004, p.3)

#### Criticisms on IDEF

- Does not make provision to indicate triggers of an activity.
- Aged methodology
- Difficult to convert to the executable BPEL4WS notation.

#### Compliments of IDEF

- Hierarchy of processes, i.e. the parent and sub-processes can be easily identified.
- Great display of the interactions between the inputs and outputs of activities.

### 4.6.3 Business Process Modelling Notation

The Business Process Modelling Notation (BPMN), was created by the Business Process Management Initiative (BPMI), in 2004. The focus of BPMI was to create a standardised modelling notation which can be used and understood by all business process designers, technical designers and managers alike. This was a much needed initiative as the process modelling industry is fragmented by the countless modelling tools and notations that are currently available (White, 2004). The gap between process design and implementation is bridged by BPMN, as one of the drivers for developing BPMN was to complement the BPEL4WS standards for executable business processes (Green et al, 2010). BPMN proved to be successful as it is widely adopted by industries such as tool vendors, education providers and modelling consultants. BPMN's popularity grew as result of their conformity with the Web Services standards. Today, BPMN has over 30 vendors of process tools in support of BPMN (Green *et al*, 2010). It is regarded as the industry standard for process modelling (Recker, 2008).

Other modelling notations such as UML, IDEF, ebXML, RosettaNet, LOVeM and EPCs were consulted and reviewed when BPMN was created (Green *et al*, 2010). BPMN is based on a flowcharting technique called a Business Process Diagram (BPD), which creates graphical models of business operations (Recker, 2008). A basic understanding of the elements of BPMN and the usage thereof is given in Appendix D.

#### Criticisms on BPMN

In Green *et al's* (2010) paper, BPMN is criticised based on a sound theoretical basis, using the BWW model, in combination with an empirical study. The criticisms according to Green *et al* (2010) and Recker (2008) were:

- Difficult to learn as there are not many examples of practical applications available.
- Lack of support in the articulation of business rules.
- Lack of support in identifying the scope of the process being modelled which indicates the hierarchy of processes.
- Pools and lanes difficult to incorporate in the model.
- Superfluous symbols/elements.
- User confusion about certain constructs.

#### Compliments of BPMN

Compliments of BPMN include:

- Easy conversion from BPMN to BPEL4WS.
- Widely accepted in the industry
- Creates comprehensive model of a business process.
- BPMN makes provision for all three levels of modelling, namely a process map, description and model of business processes.
- BPMN is constantly being revised and improved upon.
- Seems to be the way forward for process modelling

## 4.7 LITERATURE REVIEW CONCLUSION

Applications of EA in HE is still very limited, especially in South Africa. Although JISC has made considerable investments in applying EA in HEI, the true methods for doing so and implications thereof is unknown. Some case studies however revealed essential information, experience and recommendations. One of these recommendations made by KCL was that HEI should not be too concerned with the TOGAF framework. This framework did not provide enough benefits to justify the costs according to KCL. Regardless of the limited knowledge about applying EA in HE, does EA pose some great advantages for HEI when applied at an institutional level. By-in and input from top-management is however a crucial contributor in the success of EA in HE. EA initiatives must be supported and driven by top management in order to implement EA enterprise-wide.

Ross et al created a new way of implementing EA at an organization; The foundation for execution. This foundation entails for companies to identify their core business processes and to digitize them to be competitive in this ever changing business environment.

Some reference frameworks exist for HE core business processes. However, a suited framework must be selected to suit the specific needs of the organisation. Limited methods are available to provide guidance on how to identify standardisation opportunities of these core business processes. The configurable process models idea seems to be the most promising for identifying such opportunities. The method also holds potential for additional development in order to supplement the method.

It seems that the methodology created by Heinrich *et al* (2007) may also be useful in the identification of process standardisation opportunities in the Programme Amendment process and other relevant end-to-end processes.

The framework developed by Van der Merwe (2005) could pose value for assessing the University's Oracle PeopleSoft Campus Solution package and the role of Programme Development and Amendments within the package.

The Business Modelling Techniques discussed delivered various insights on the advantages and disadvantages of each technique. It does seem however that the BPMN modelling technique is the best notation to follow as it is regarded as the way forward for Business Process Modelling.

## 5. CONCEPTUAL DESIGN

This chapter aims to develop a suitable method to identify standardisation opportunities within any end-to-end process across different business units at the University. The end-to-end process under concern for this project is the Programme Amendment process. The research design method that is followed is depicted in Figure 19. The first step of the process aims at diagnosing the current process that is followed by the business unit of concern. The business unit can include the Quality Unit, EMS Faculty or the Department of Industrial Engineering within the EBIT Faculty. The process objectives, principles and qualitative measures/objectives are also identified during this step. The second step entails designing a reference model for the process according to the diagnostic results. It is required that the reference model must include a method to document certain variations in the process. This step may also incorporate any improvements that were identified. The last step of the design cycle entails validating the reference process model by implementing the reference process model.

Once a suitable reference model and method for identifying standardisation opportunities is selected, will the process undergo iterations to find a recommended best practice process for programme amendments.

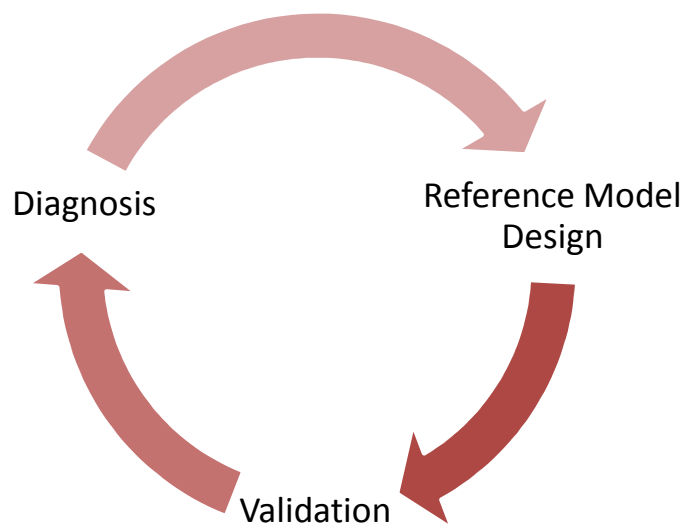
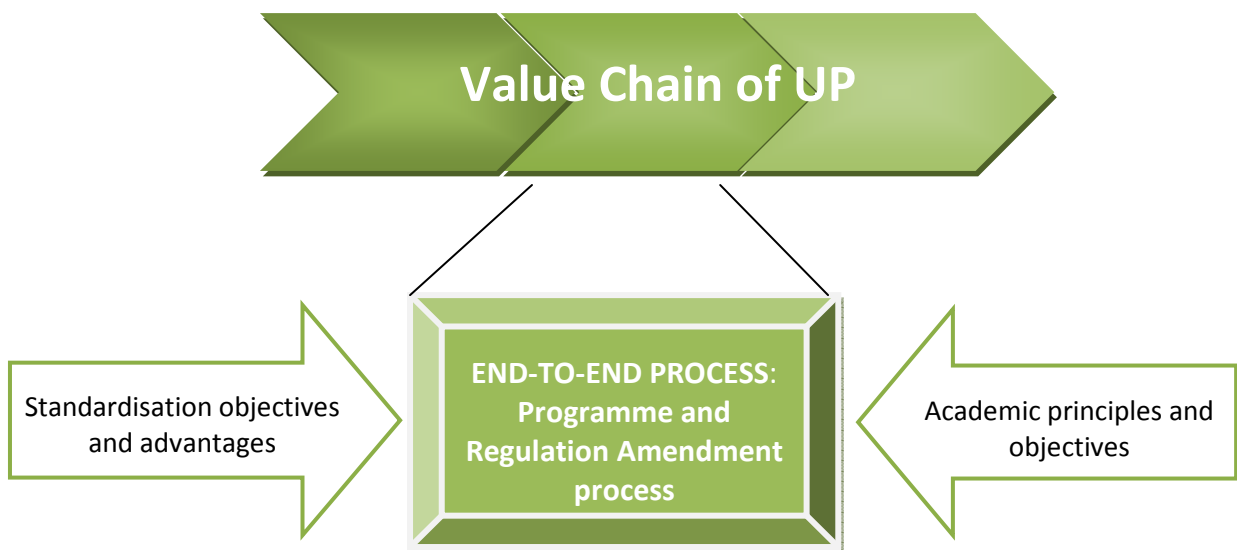


Figure 19: The research design method cycle

### 5.1 REQUIREMENTS AND OBJECTIVE FOR A STANDARDISED PROGRAMME AMENDMENT PROCESS.

The Programme Amendment process is influenced by factors such as standardisation objectives and academic principles and objectives of a certain department/faculty. The process should not override or undermine the necessary academic purposes and principles of the various processes and thus satisfy all the external factors. Figure 20 gives a graphical representation of the factors influencing the process.



**Figure 20: The Programme and Regulation Amendment process' influencing factors**

A paradigm war might occur when standardising the Programme Amendment process. The lecturers need freedom of academics while an open management system is required for the amendment process of the EMS Department (Dresselhaus, 2010). It is also important to consider that some processes are assumed to be standardised, but may not necessarily be meant for standardisation as the processes are led by human interaction. Other academic and standardisation objectives entail to following (North, 2010; Dresselhaus 2010):

- Maintaining healthy programmes. A healthy programme does not contain scope creep. Scope creep is a situation that occurs when a programme is not documented, thus are modules developed in isolation and duplicate module contents are presented as a result. Each course-coordinator adopts their module as they see fit, without the consultation of all the other modules in the same Department or other Departments presenting the same programme.
- The selected method should make provision to consider all the sub-processes behind the parent processes and the effects of process standardisation.
- The implications of implementing a new, improved process into a dynamic processes being used should also be incorporated in the selected methodology.
- Tension dynamics of a standard process such as whom is responsible and whom is accountable for what should be considered.
- The process needs to be streamlined to reduce the time it takes to make amendments. This is necessary to ensure the programmes stay relevant by being agile.
- Process should allow enough consultation opportunities as an attempt to eliminate possible errors in the amendment proposal.
- An attempt to deliver an evidence based design.



The current PeopleSoft reference framework is analysed and supplemented by the SAP reference model in section 5.2. Three conceptual methods are developed and validated in section 5.3. Validation of the methods are presented in section 5.4 which also explores the results, advantages and disadvantages of each method. This section also attempts to develop a best-practice Programme Amendment process for the University of Pretoria. Finally are the constraints and recommendations of the research project discussed in section 5.5 and 5.6 respectively.

## **5.2 REFERENCE MODELS FOR HEI CORE BUSINESS PROCESSES**

A process for amending programmes or modules should be included in the value chain of a HEI as this is one of the core business functions of such an institution. Without processes like these, the institutions will grow stagnant and won't be able to succeed and be competitive. However, the PeopleSoft Campus Solutions package does not make provision for such processes and is a deficiency in the package. It may thus be necessary to supplement this package by adding such a process according to the institutions' specific needs.

Other packages or models can be analysed or referred to when deciding what is best practice for this specific institution, in order to incorporate it into the PeopleSoft model.

The SAP Higher Education Solutions Map does make provision for such processes as can be seen in Figures 10 and 11 in section 4.4.2 under the Content Development and Management section within Academic Services and Learning. The Academic Services and Learning consists of the Academic Profile, Operational Planning and Teaching and Studying models. In the PeopleSoft Campus Solutions provision may be made within the Teach, Learn and Evaluate module.

## **5.3 METHODS FOR IDENTIFYING STANDARDISATION OPPORTUNITIES**

Three methodologies to identify standardisation opportunities will be discussed, tested and explored in this section. These methods will first be tested and analysed by using the Programme Amendment process of the Quality Unit and the process as used by the EMS Department. After the methodologies have been tested for usability, correctness and applicability, the most suitable method will be identified and applied for the purpose of this project.

### **5.3.1 Method 1**

The basis of identifying standardisation opportunities lies within the functionality of the activities/functions in the process, according to the method developed by Heinrich *et al* (2007), as discussed in section 4.5.1. Heinrich *et al* (2007) state that if the inputs and outputs of various functions/activities are similar, possibilities for standardisation exist, regardless of how the activity is executed.

By using the input-output analogy can functional similarities be identified, which in turn indicate standardisation opportunities. However, it is not stipulated how to map these inputs and outputs involved with the various activities as the methodology by Heinrich *et al* (2007) requires manual comparison, by process experts, of the functional similarities. Fortunately the methodology does clearly

state how to break an E2E process down into its various elements. This is done by using the method called aggregation/disaggregation and generalisation/specialisation relations.

Another deficiency with the aforementioned method is the lack of an indication of the process flow. Thus, it may not be useful to use this method alone to map the Programme Amendment process at UP. Therefore a supplementary method, which will be a variant of the original method, will be developed and discussed.

It is stated by Heinrich *et al* (2007), the functional similarities can be compared by the usage of an adequate modelling notation tool. Thus, one methodology that may be useful in the process of identifying standardisation opportunities, is to supplement Heinrich *et al*'s methodology (2007) by combining it with the BPMN modelling technique. This will entail mapping of the inputs and outputs of an activity in the selection matrix, by using artefacts or annotations.

### *The steps*

- 1) First the E2E process needs to be divided into its various generic sub-processes on the horizontal plane. Furthermore the various stakeholders involved in the E2E process must be divided into internal and external stakeholders on the vertical plane. It is important to note that the stakeholders does not represent the different business units, but rather the various role players. The stakeholders substitute the characteristics of the original method. Figure 21 represents this step.
- 2) With the second step the individual generic processes will be organised in the matrix as involved with the sub-processes as divided on the horizontal plan. This is also indicated in Figure 21. Note that the process flow is indicated by numbering in the right-bottom corner. Step 1 and 2 combined represent the first model level of the original methodology.
- 3) For the second model level, the generic sub-processes must be further divided into their respective generic sub-processes on the horizontal plane. On the vertical plane the various external and internal stakeholders must be identified and included in the matrix. This is represented in Figure 22.
- 4) This step entails organising the respective processes according to the responsible entities/stakeholders and generic sub-processes in the matrix. This step contains much more detail such as where the outputs are going from the activity. This is also included in Figure 22.
- 5) Now that the process has gone through the various iterations of dividing the E2E process into the various components, the BPMN component can be included. This entails including the event elements and indicating the respective inputs and outputs of the activity by annotations/artefacts. This is indicated in Figure 23.
- 6) The last step involves comparing the inputs and outputs and identifying where the respective stakeholders are executing the same function. This last step is also included in Figure 23.

\* All the steps above need to be repeated for each business unit. This is necessary as each business unit's process may be different and thus manually compared for similarities.

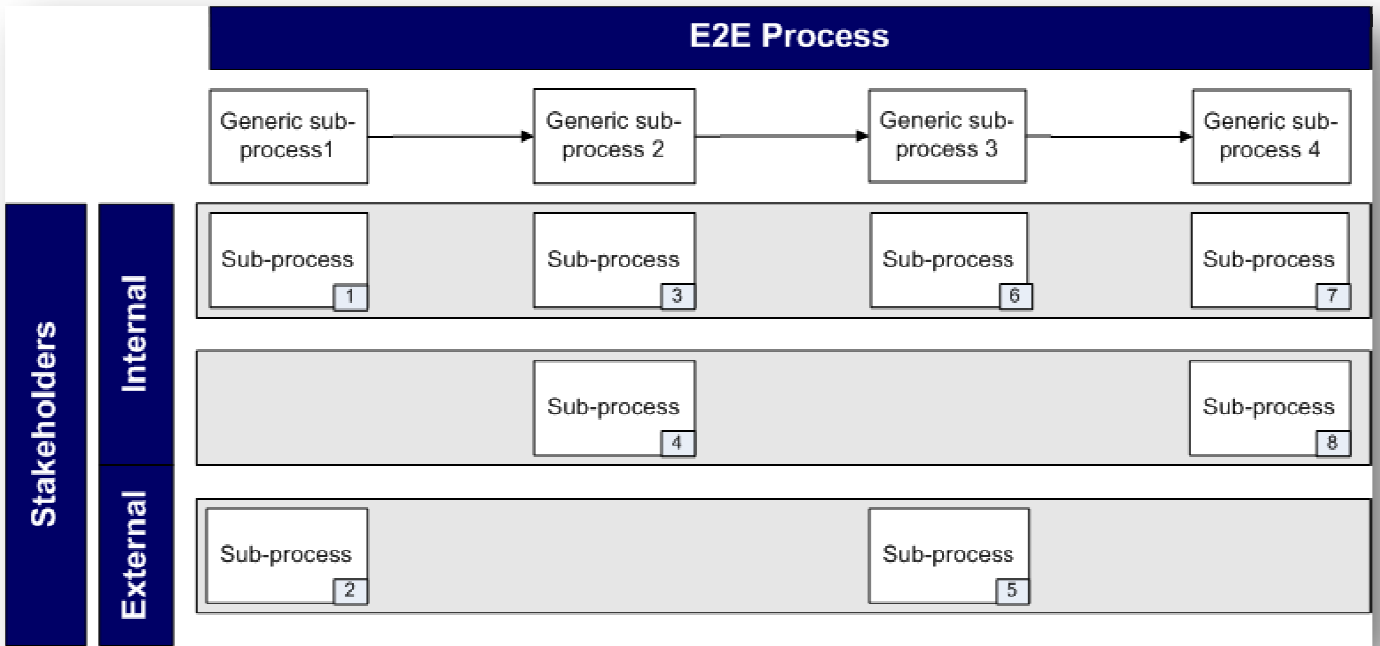


Figure 21: Steps one and two of method one.

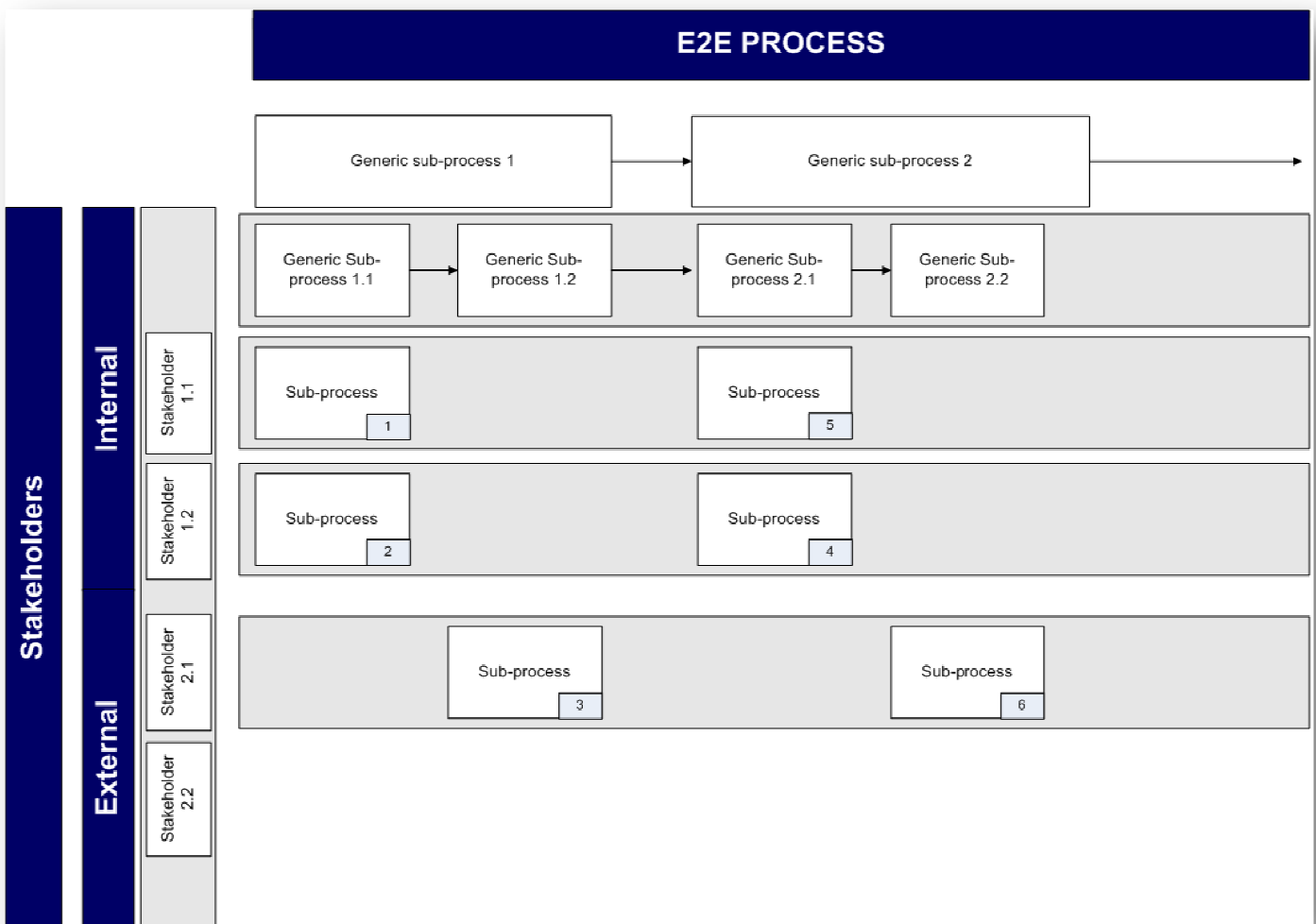


Figure 22: Steps three and four of method one.

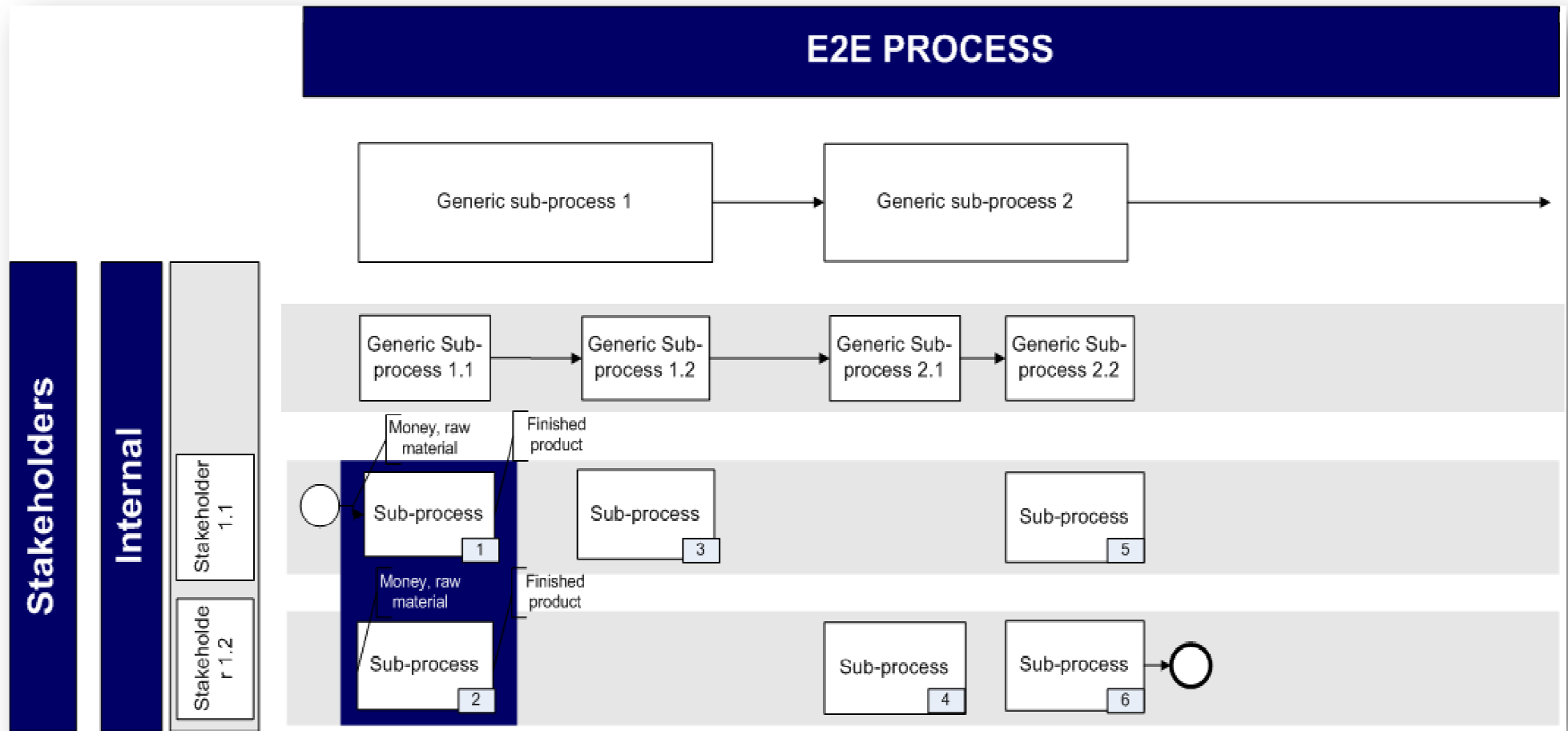


Figure 23: Steps five and six of method one.

### 5.3.2 Method 2

The second method entails mapping the respective processes using the BPMN notation. The inputs and outputs of the activities will need to be incorporated in the process models. This may be done by using the Artefact or Annotation element. By indicating the input and output relations, a comparison can be made between different activities' functionality. Process variants can then be identified and highlighted. Unjustified variants also indicate standardisation opportunities.

The pools and swimlanes may be a difficult function to incorporate within these processes as it entails various responsible entities and thus congesting the model. Therefore it is proposed to eliminate this function and thus eliminating the parties involved. Appendix D can be consulted for the BPMN elements and the basic understanding thereof. The steps for the method are explained below.

*Step 1)* This step entails mapping the process under concern in the Business Process Modelling Notation. The inputs and outputs are indicated using artefacts/annotations and events that triggers the flow of a process is also included. Figure 24 illustrates this step.

*Step 2)* This step involves identifying where similar inputs and outputs are present as well as process variants. An example of this step is given in Figure 25.

*Step 3)* The process variants are now investigated in order to analyse whether it's justified or not. Standardisation opportunities exist where these process variants cannot be justified.

\* All the steps above need to be repeated for each business unit. This is necessary as each business unit's process may be different and thus manually compared for similarities.

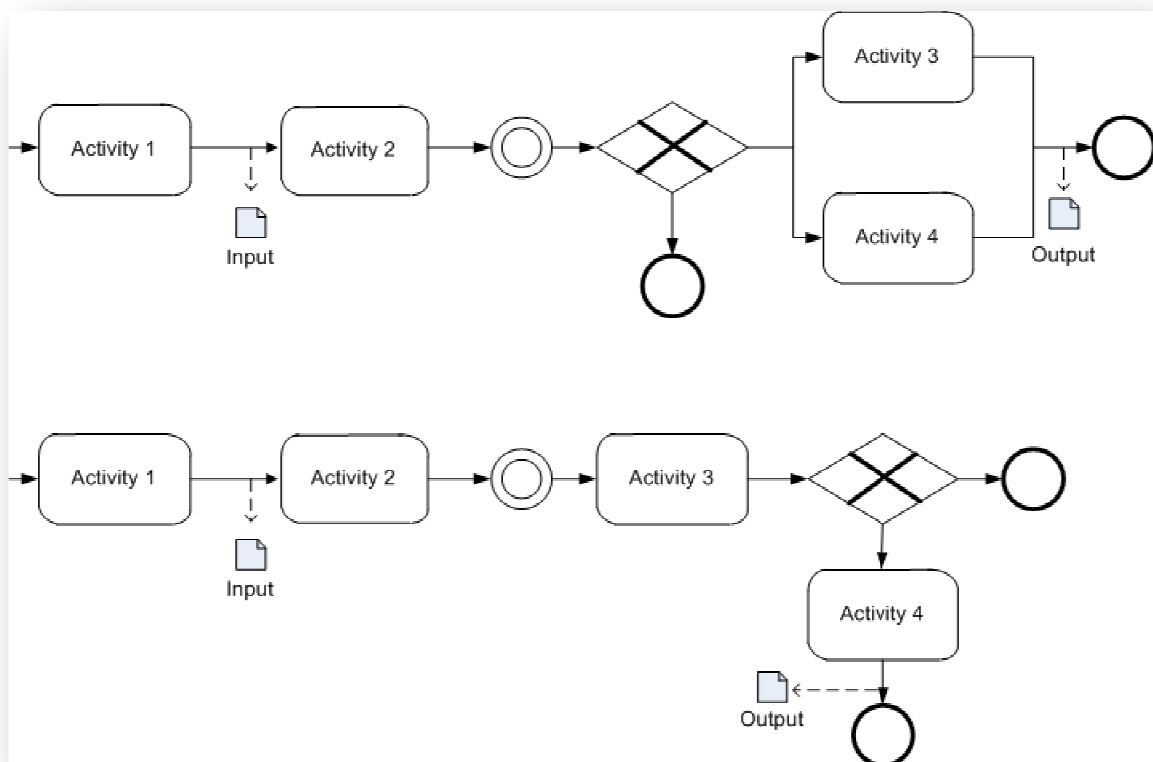


Figure 24: Step one of method two

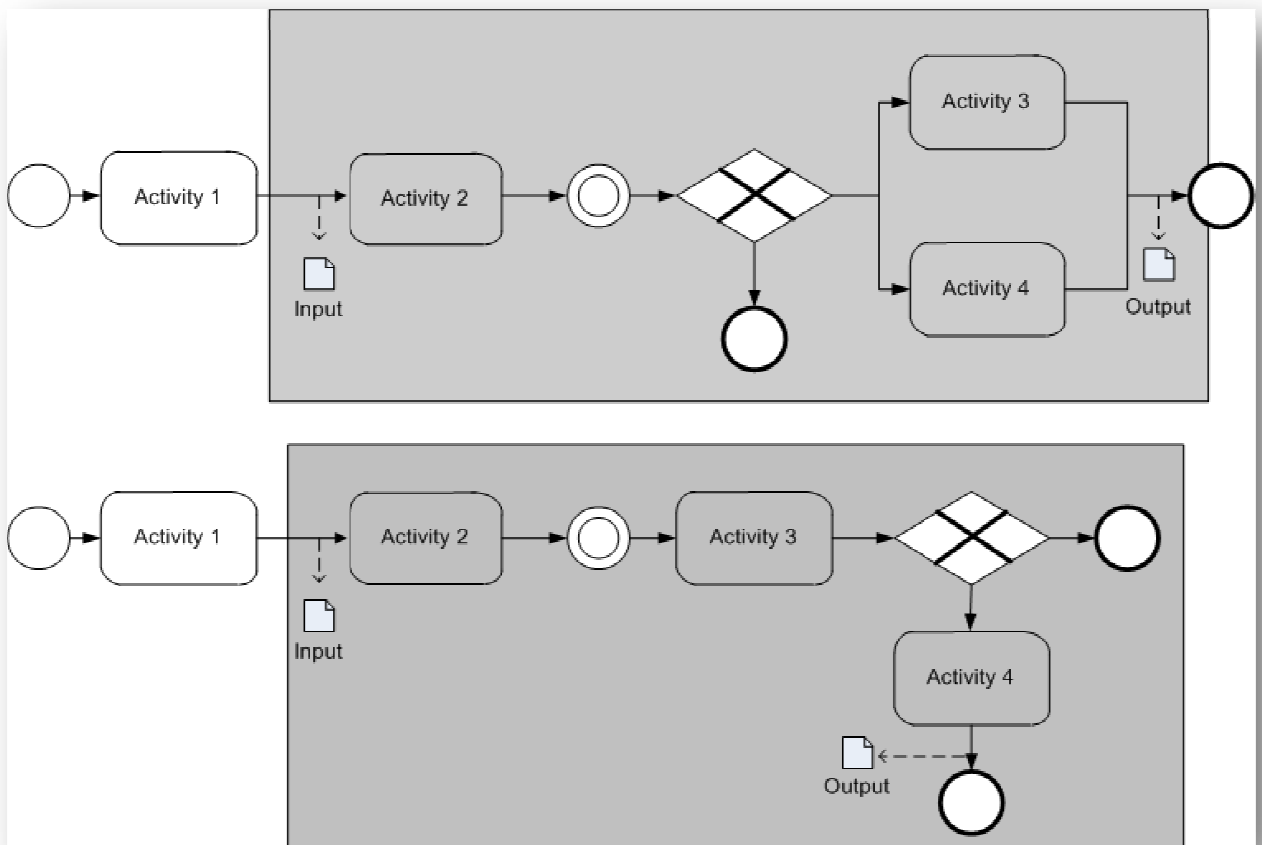


Figure 25: Step two of method two

### 5.3.3 Method 3

This methodology is based on the configurable process model developed by La Rosa & Dumas (2008). It uses the configurable variation points to indicate variation in different processes. However, the method does not make provision for the various role players and the variation in their involvement. The method is supplemented by making provision for this deficiency by configuring the role players, thus the swimlanes. Configurable swimlanes are indicated by a thick border, just as the configurable gateways and tasks. A questionnaire is developed for the process model to assist in configuring the individualised process models with the specific role players involved. The question relevant at each configurable gateway or swimlane is indicated by an artefact, referencing back to the questionnaire.

It is important to note that this method provides a recommended process for business units at various levels of development, as it isn't possible for each business unit to be at the same level of development. The recommended process is not a conventional 'to-be' process, as business units at different levels of development and cannot be forced to follow a certain process. The process may be too advanced. A conventional 'to-be' process will represent the ideal process, which is not always possible to achieve unless one is at the ideal level of development. It will however be useless to recommend a process that not all business units can follow. This method is attempting to provide a recommended process which all business units can follow, regardless of their level of development. The method is

also attempting to provide guidance for the lesser developed business units to develop further.

A simple colour code system incorporated into the method, as some of the role players are involved at various stages of the process. The RACI method is used to indicate the responsible, accountable, informed and consulted role players of each activity. The RACI method is explained in Figure 26 and an example of the supplemented configurable process model is given in Figure 27.



Figure 26: The RACI method

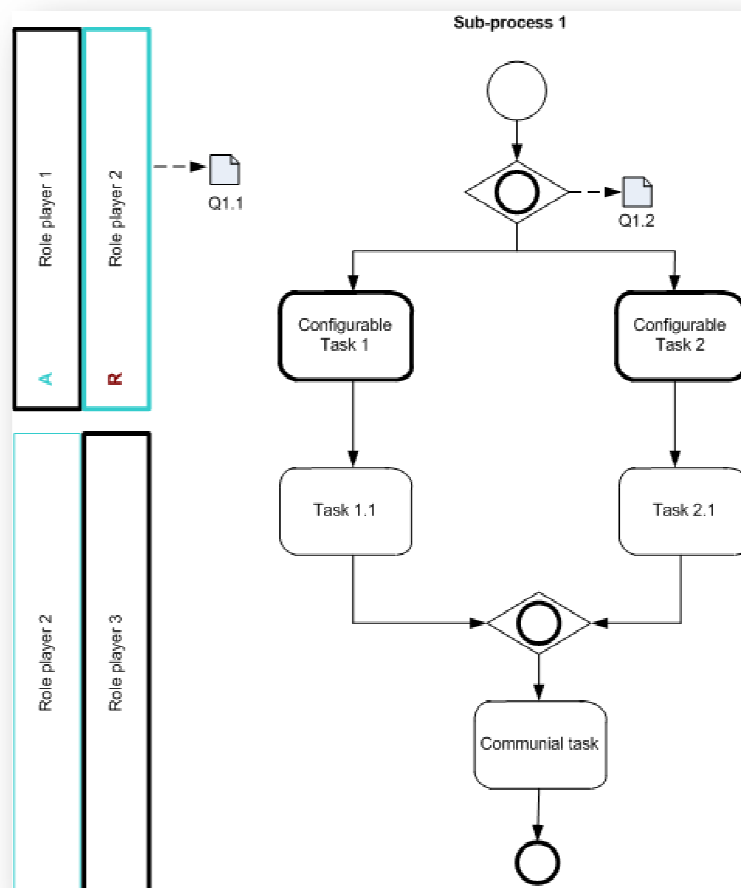


Figure 27: Example of method 3

## **5.4 VALIDATION**

The supplemented methodologies are modelled in this section to validate the suitability of the methods. The Programme Amendment process according to the Quality Unit and the EMS faculty were modelled using the first methodology and then followed by the second and third. This is done in section 5.4.1 – 5.4.3. The findings of the methodologies are provided in section 5.4.4. The methodologies are compared by the various advantages and disadvantages, where after the most suited method is identified. This is discussed in section 5.4.5. Section 5.4.6 attempts to develop a best practice process for the amendments of programmes at the University by using the selected methodology. This will also help validate the recommended methodology's credibility. Section 5.5 and 5.6 discusses the constraints of the project and recommendations respectively.

### **5.4.1 Method 1**

The Programme Amendment process is modelled using the first methodology. Figures 28 and 29 indicate the process according to the Quality Unit whereas Figures 30 and 31 indicate the process according to the EMS faculty. Both the processes are divided into two parts for simplicity. The grey activity in the Figures 28 and 30 specifies where Figures 29 and 31 continue.



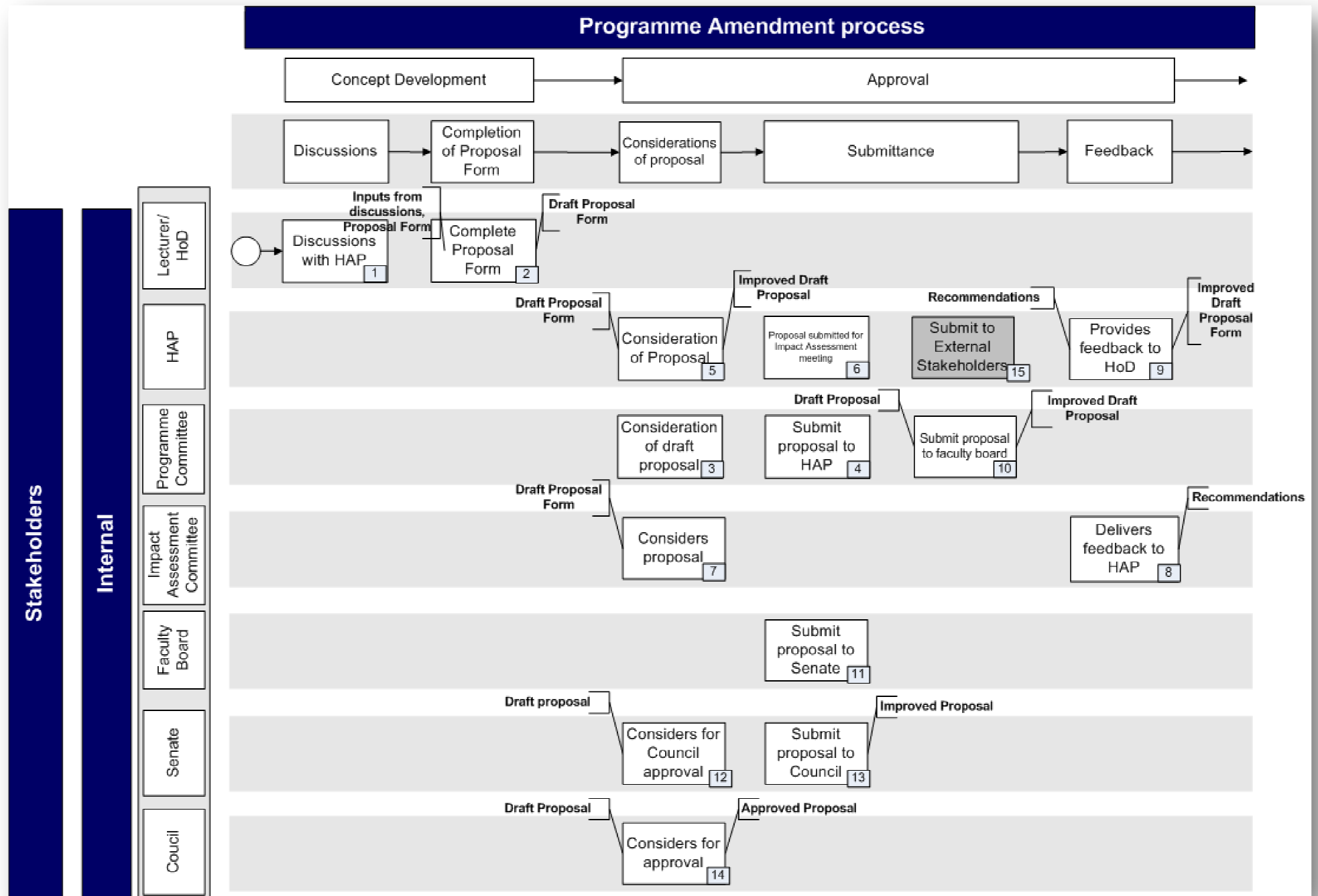


Figure 28: The Programme Amendment process according to the Quality Unit (1).

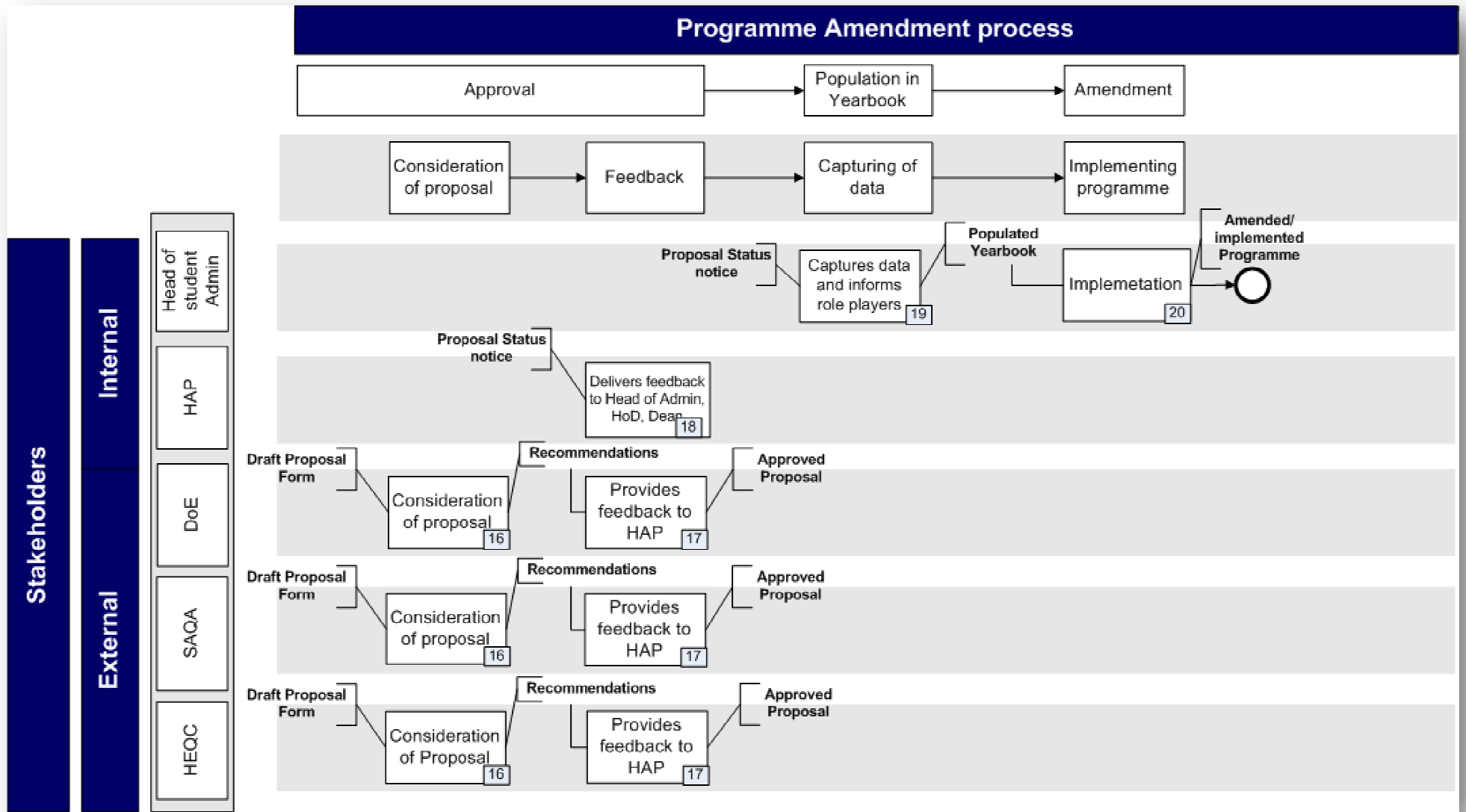


Figure 29: The Programme Amendment process according to the Quality Unit (2).

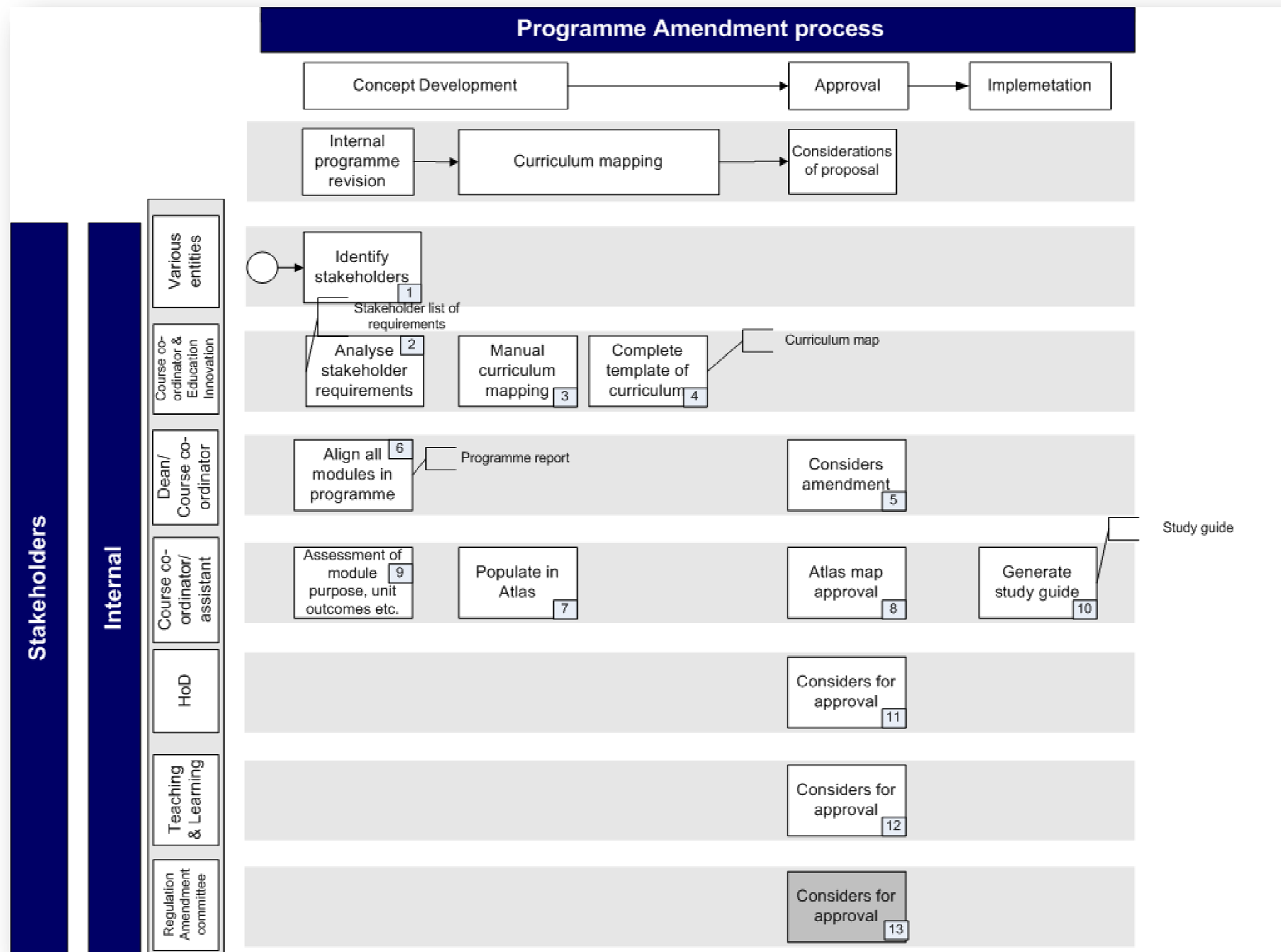


Figure 30: The Programme Amendment process according to the EMS faculty (1).

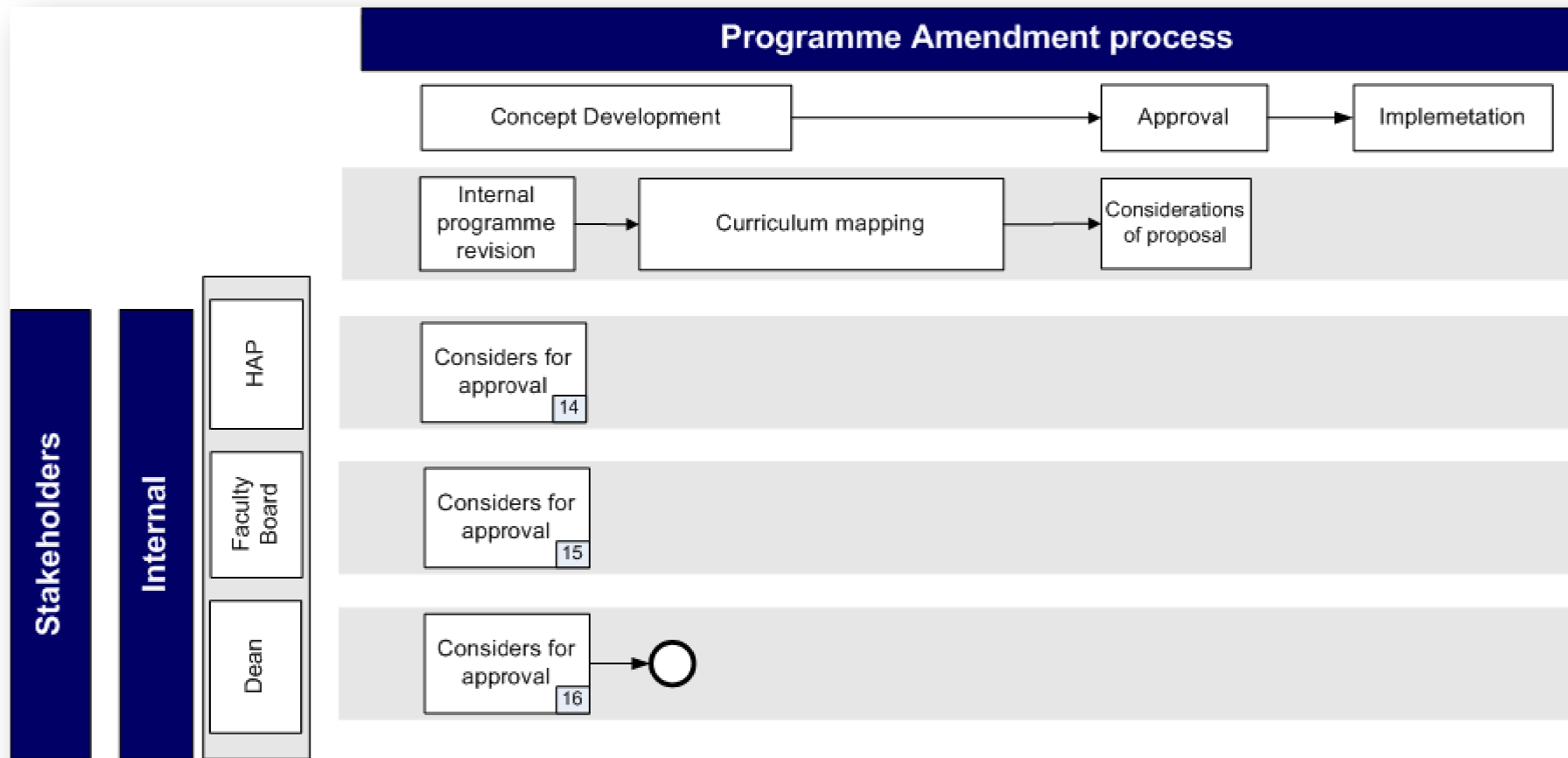


Figure 31: The Programme Amendment process according to the EMS faculty (2).

## 5.4.2 Method 2

The Programme Amendment process according to the Quality Unit as well as the EMS faculty were modelled using BPMN. Pools and swimlanes are not included in the diagram as mentioned previously. Figures 32 and 33 below depict the Quality Unit's Programme Amendment process diagram whereas Figure 34 depicts the process according to the EMS faculty. The process is divided into two main parent processes each with the respective sub-processes.

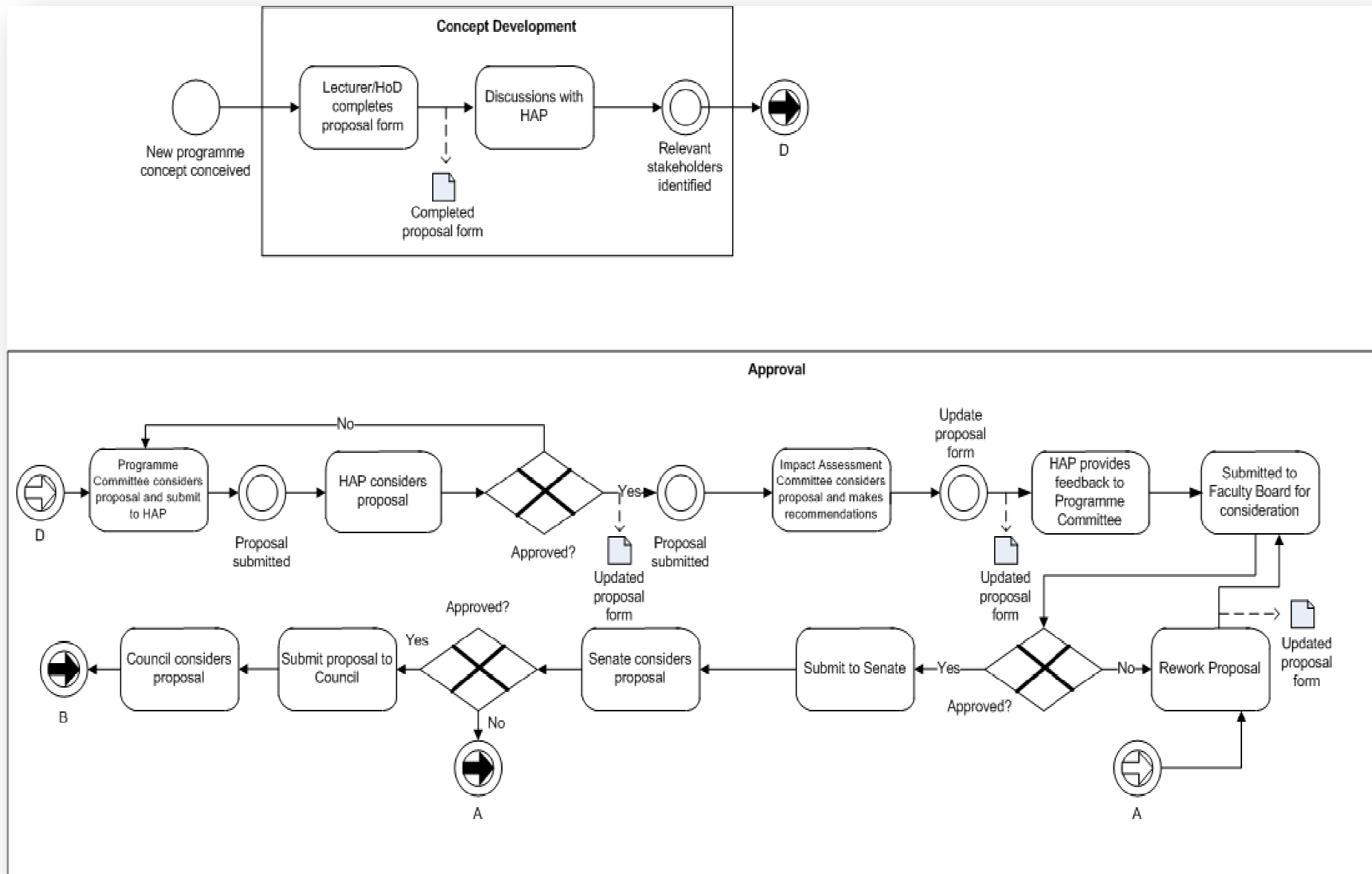


Figure 32: The Programme Amendment process according to the Quality Unit(1).

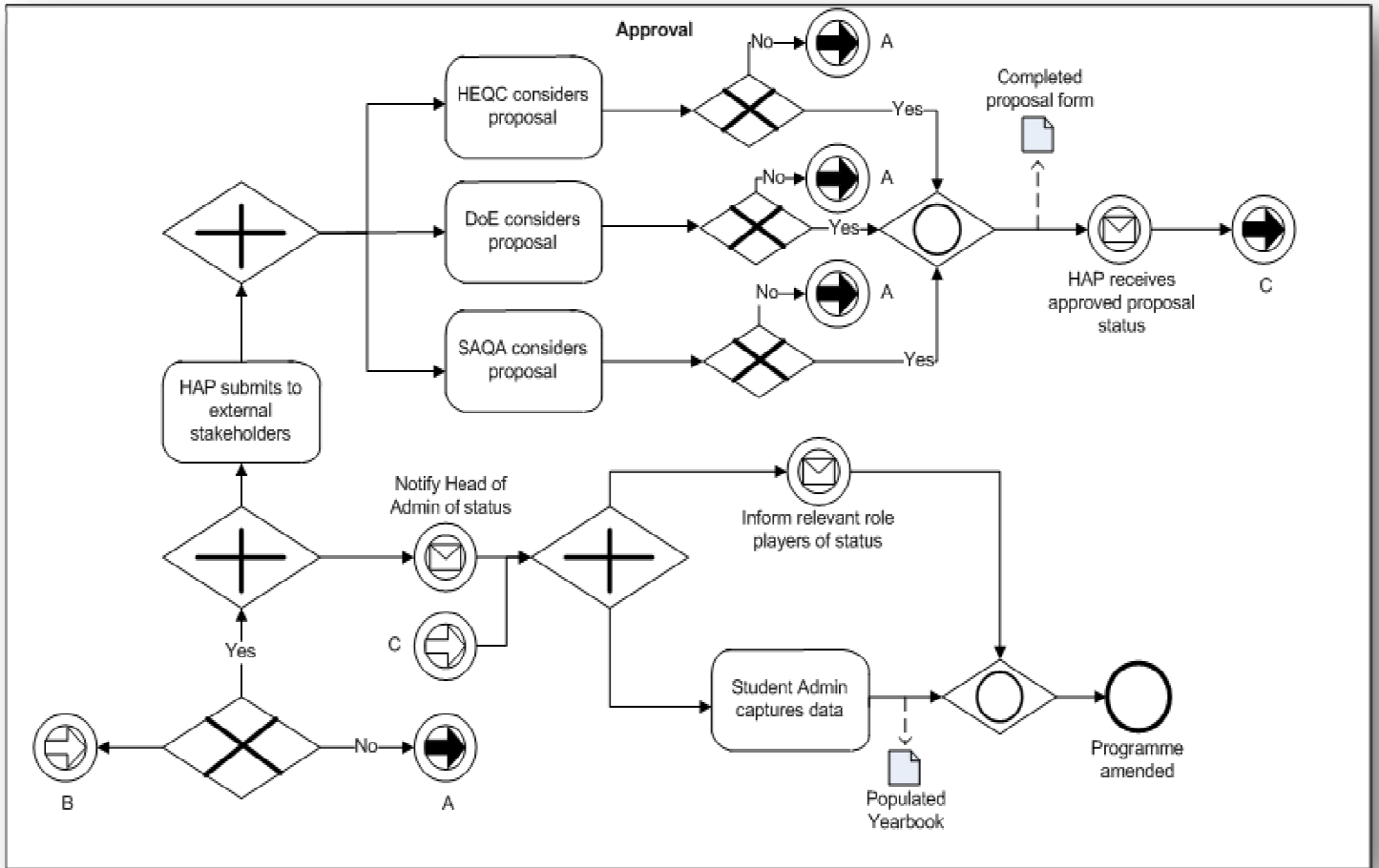


Figure 33: The Programme Amendment process according to the Quality Unit(2).

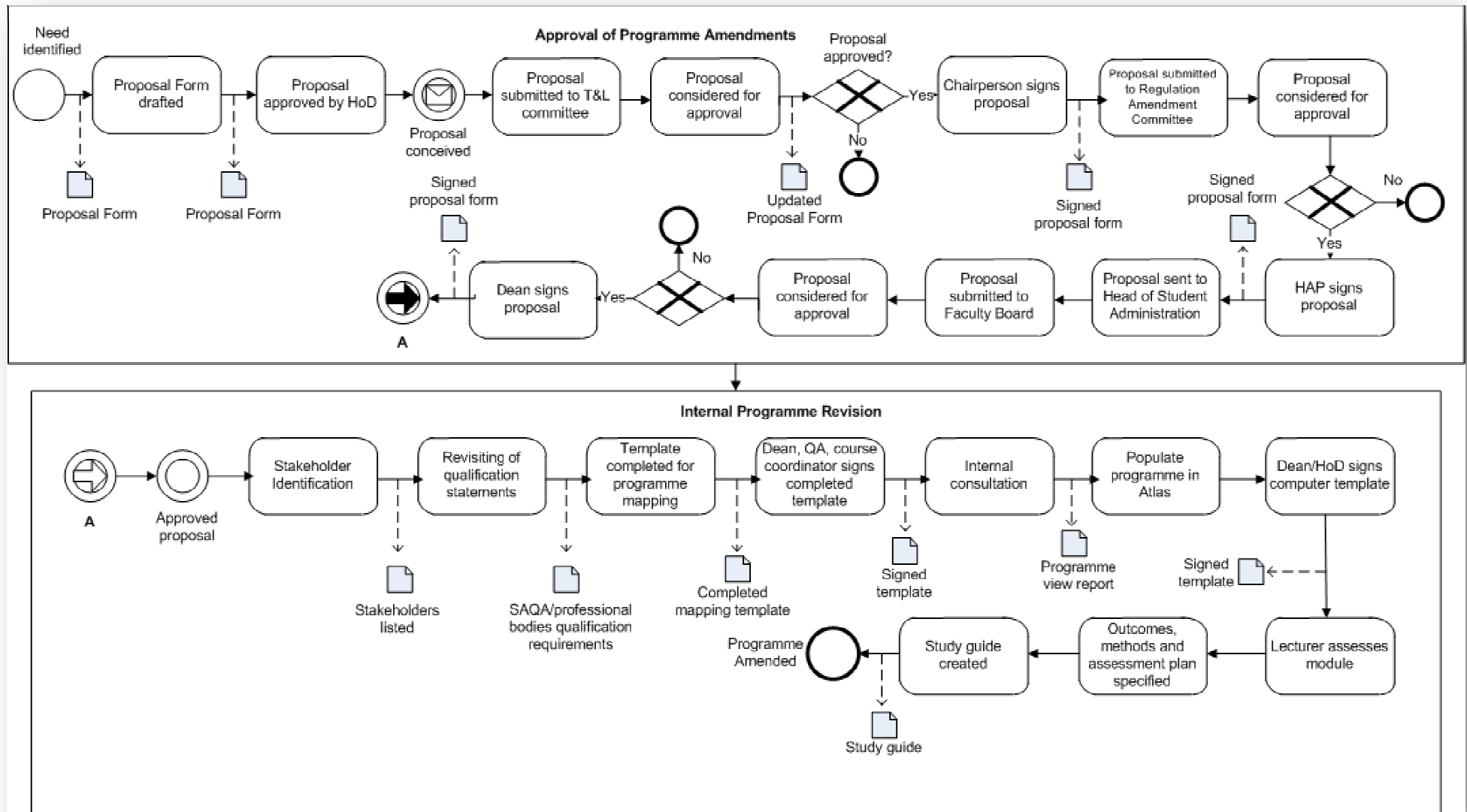


Figure 34: Programme Amendment process according to the EMS faculty



### 5.4.3 Method 3

The Programme Amendment process of the two parties of concern is modelled in figures 35 and 36. The differences in the processes are indicated by the configurable gateways and swimlanes. The questionnaire supporting the configurable elements is provided in figure 37.

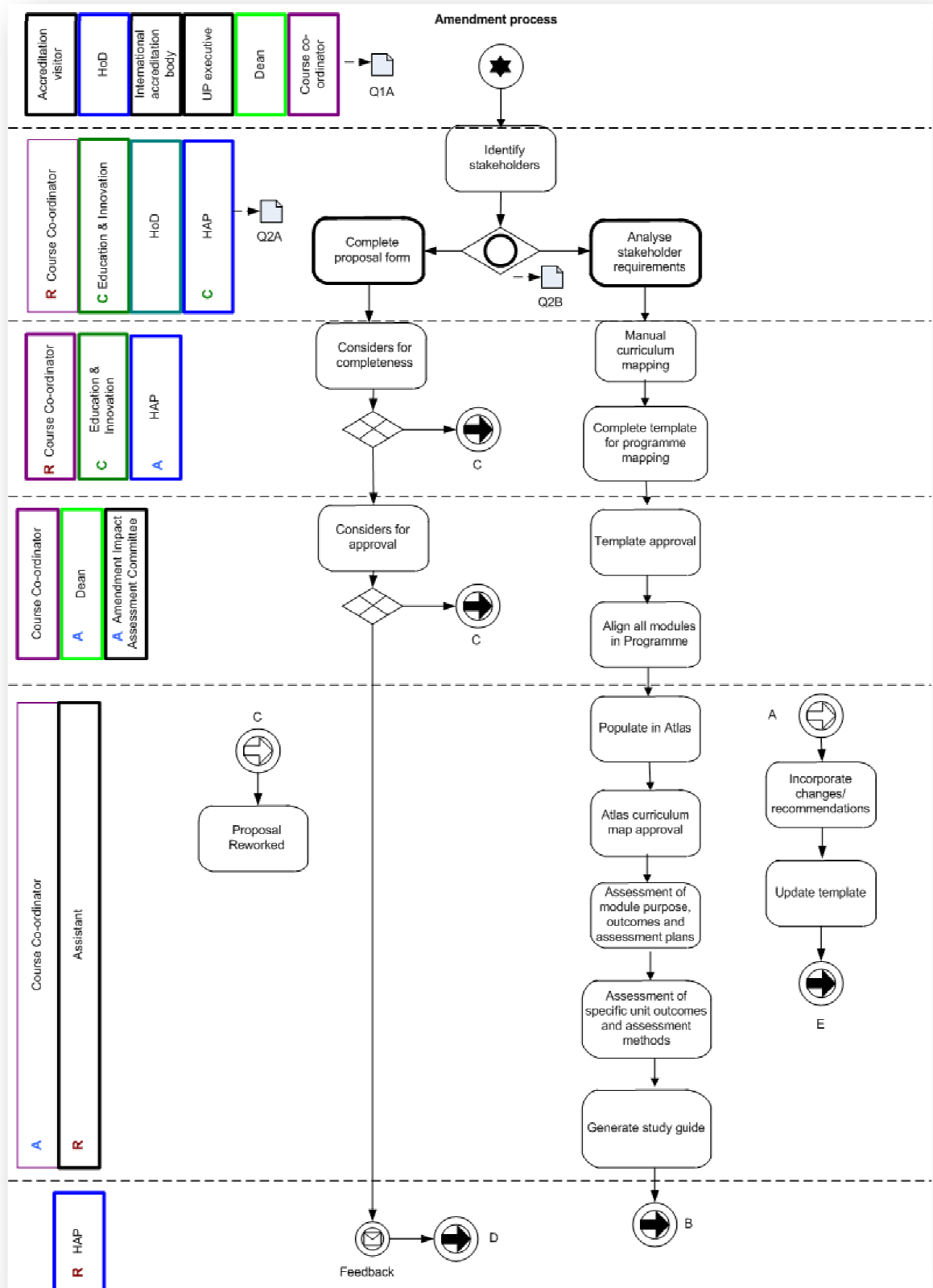


Figure 35: Programme Amendment process (1).

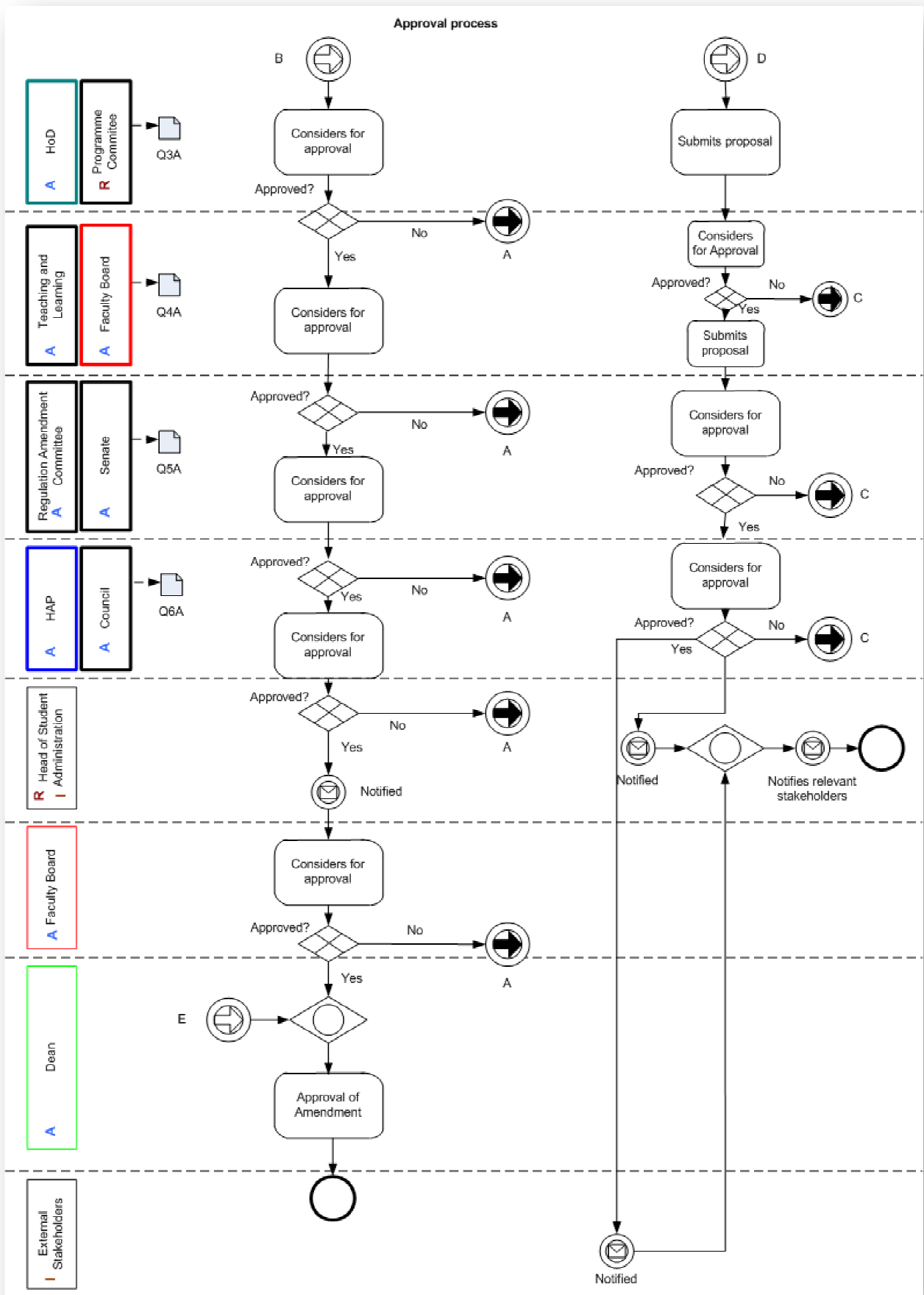


Figure 36: Programme Amendment process (2).

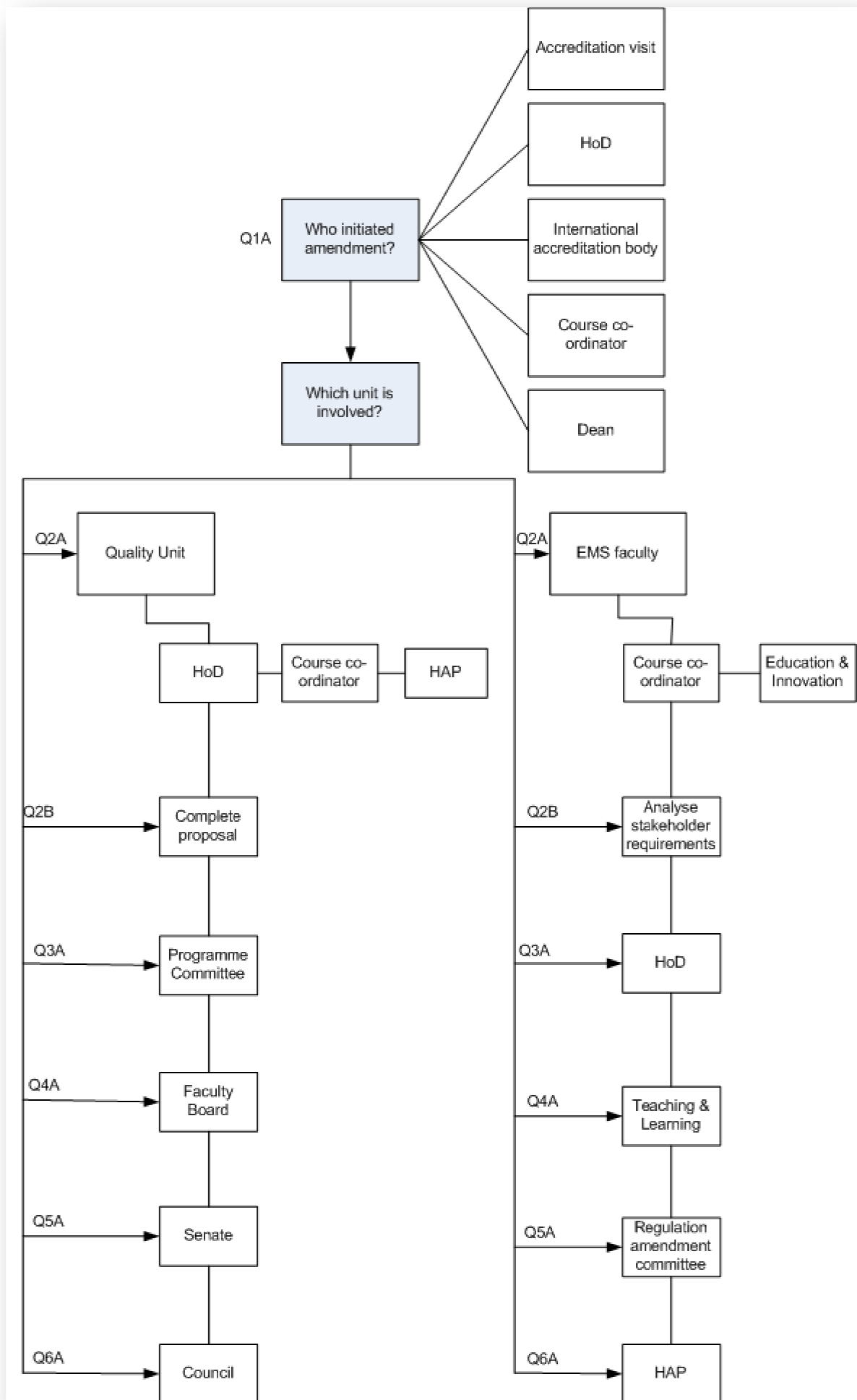


Figure 37: Questionnaire of the configurable process model

## 5.4.4 Results

### Method 1:

This method seems not to be very suitable for the purpose of this project. Identifying the differences in the two processes was a difficult and confusing task to perform. The method requires the analyst to map the processes under concern individually and then making the comparisons manually. This may require a process specialist. It also seems that this methodology is more applicable for different product or product channels which are part of SOA, not for end-to-end processes consisting of different business units/roles. The numbering method does make the flow of the process more understandable, but it is still not visually appealing. However, the aggregation/disaggregation and generalisation/specialisation was a relatively easily performed. This modelling method does not make provision for high volumes information. It may be difficult to implement this method within the processes at different business units as the sub-processes and stakeholders may vary to a large extent. This will complicate the effort of identifying standardisation opportunities.

### Method 2:

This method proved to be more complex and difficult to model. It requires a great deal of information, which may be hard to find. However, it seems that although more detailed information is required does it make the process more understandable and can better decisions be made regarding changes. This may be useful as it is necessary to know as much as possible of the process when considering standardisation opportunities. It is very difficult to model the various role players with this method, which is a big deficiency. The Programme Amendment process contains variation regarding the involvement of the role players, and indicating this variation is crucial. This method requires mapping all the different processes under concern and comparing the processes manually which is another drawback. It is observed from the mapped processes that it is very difficult to actually identify and indicate the variations in the processes.

### Method 3:

This method proved to be exceedingly useful. This method proved to be the only method that accounts for all the requirements stated previously in this section. The usage of the configurable swimlanes makes indicating and identifying variations regarding the role players' involvement very simplistic and visual. No manual comparison is required, as the configurable process model clearly indicates all the variation points. This method also justifies differences by asking questions regarding the variation. The colour codes of the role players helps to identify where duplicate role players are present. The RACI method indicates where the various responsibilities and accountabilities lie, which help eliminate possible tension dynamic problems. The process map that is developed contains a great deal of information which is necessary when decisions are made regarding standardisation. The configurable process models are easily understood by non-experts. This benefit is central as non-experts can make the comparisons and add value. This method can be used not only to identify standardisation opportunities, but to develop a standardised process as well. It allows justifiable variations according to the

process' needs. This is the only method that satisfy all the stages of development of a business unit.

### 5.4.5 Advantages and Disadvantages

The advantages and disadvantages of each of the methods are summarised in the Table 1 below.

	ADVANTAGES	DISADVANTAGES
METHOD 1	Aggregation/disaggregation and specialisation/generalisation easily performed	Does not make provision for high volumes of information
	Not very time consuming	Indicates limited knowledge of process
	Numbering indicates process flow without congesting the model	Difficult to convert to BPEL.
		Identifying the differences in is difficult and confusing, requires manual comparison
		Requires a different process map for each of process under concern
		Difficult to implement across different business units
METHOD 2	Indicates high volumes of detail	Complex and difficult to apply
	Can easily be converted to BPEL	Information required difficult to find
		Cannot include role players
		Manual comparison need to be made by a process expert
		Requires a different process model for each process under investigation

METHOD 3	Easily understood	Information required difficult to find
	Includes the role players' variation	Mapping process is time consuming
	Visual comparison can be made	
	Questionnaire justifies variation	
	Indicates responsibilities	
	Requires only one process map regardless of number of processes under investigation	
	Used for all levels of development	

**Table 1: Advantages and Disadvantages of methods**

The third method, configurable process models proved to be the most suitable, practical and valuable method for identifying process standardisation opportunities. The potential of this method is far unrecognized and more advantages may be experienced when applied. The method accounts for all the requirements of a method for identifying standardisation opportunities and is the selected method to apply in the rest of this project.

#### **5.4.6 Developing a best-practice Programme Amendment process**

This section attempts to develop a possible best practice for the Programme Amendment process by doing two iterations of the process. An organogram, depicted in Figure 46 and a roles and responsibility table, given in Table 2, are given to illustrate the role players' position in the governance structure of the University as well as what their responsibilities are. The complete governance structure of the University can be seen in Appendix H. Appendix F gives an extract of the Economic and Management Science's 2010 Yearbook. This is done to illustrate the usage of Yearbooks, as it is mentioned in the process models. The standard proposal form that needs to be completed for the amendment process is also provided in Appendix C.

##### **Iteration 1**

This iteration entails comparing the theoretical process with the actual process, according to the Auditing Department and the School of Public Management and Administration within the EMS faculty and the Industrial Engineering Department within the EBIT faculty. Figures 38 to 40 illustrates the processes and their variation. A questionnaire following the reasons for variation and to individualise the process is given in Figure 41.

## Iteration 2

The second iteration entails incorporating the recommended improvements into the process model to achieve a possible best practice process. Figures 42 to 44 depict the recommended Programme Amendment process together with the questionnaire in Figure 45. Plant & Malan (2010, pers. Comm. 22 September); Yadavalli (2010, pers. Comm.. 23 September); Claasen (2010, pers. Comm.. 23 September) recommended the following changes to be incorporated:

- To involve an experienced lecturer in the curriculum analysis and mapping stage
- To make the involvement of an education consultant compulsory and thus non configurable with the curriculum analysis and mapping.
- To differentiate between amended and renewed programmes in this process model.

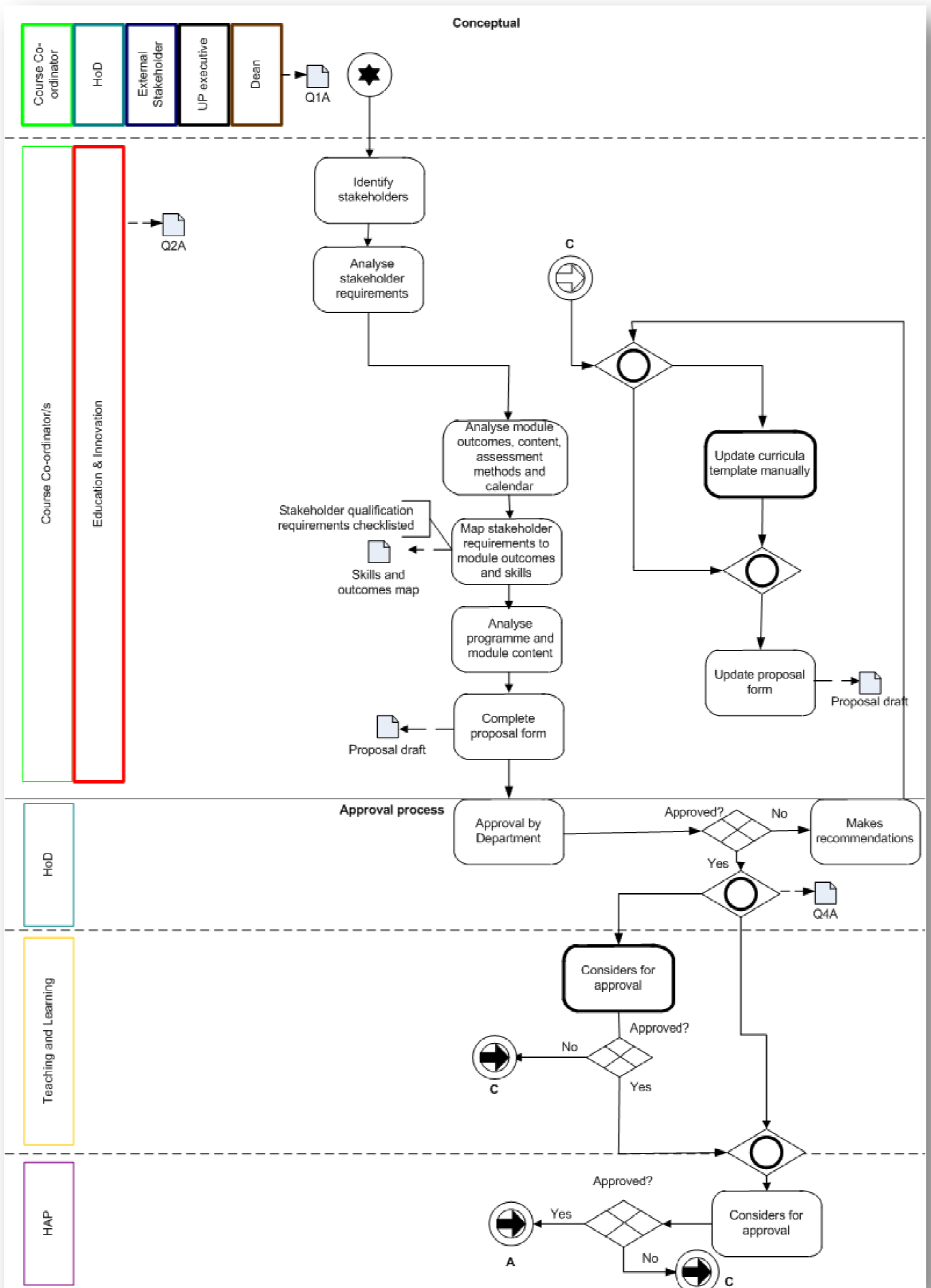


Figure 38: AS-IS Programme Amendment process (1).



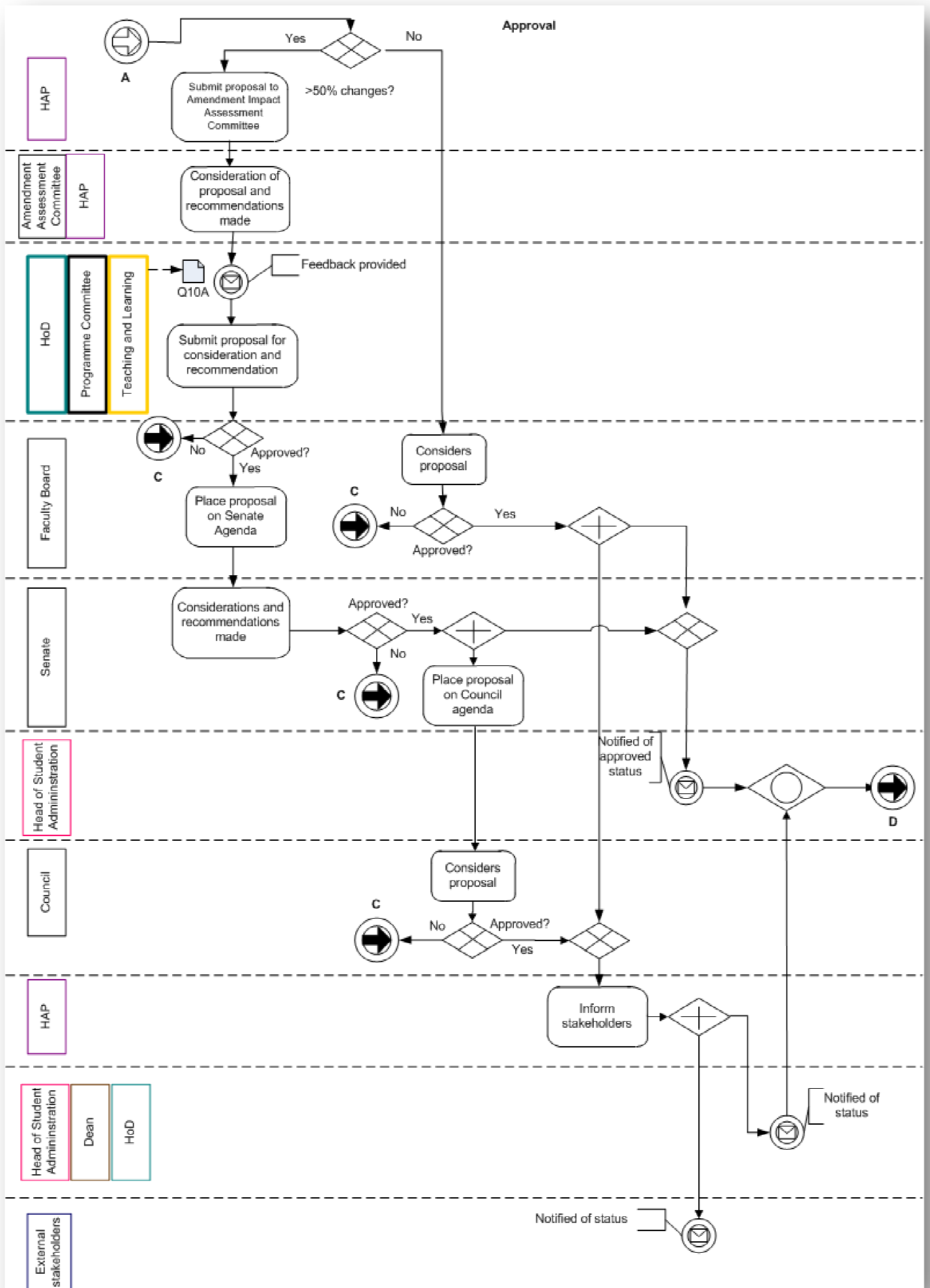


Figure 39: AS-IS Programme Amendment process (2)

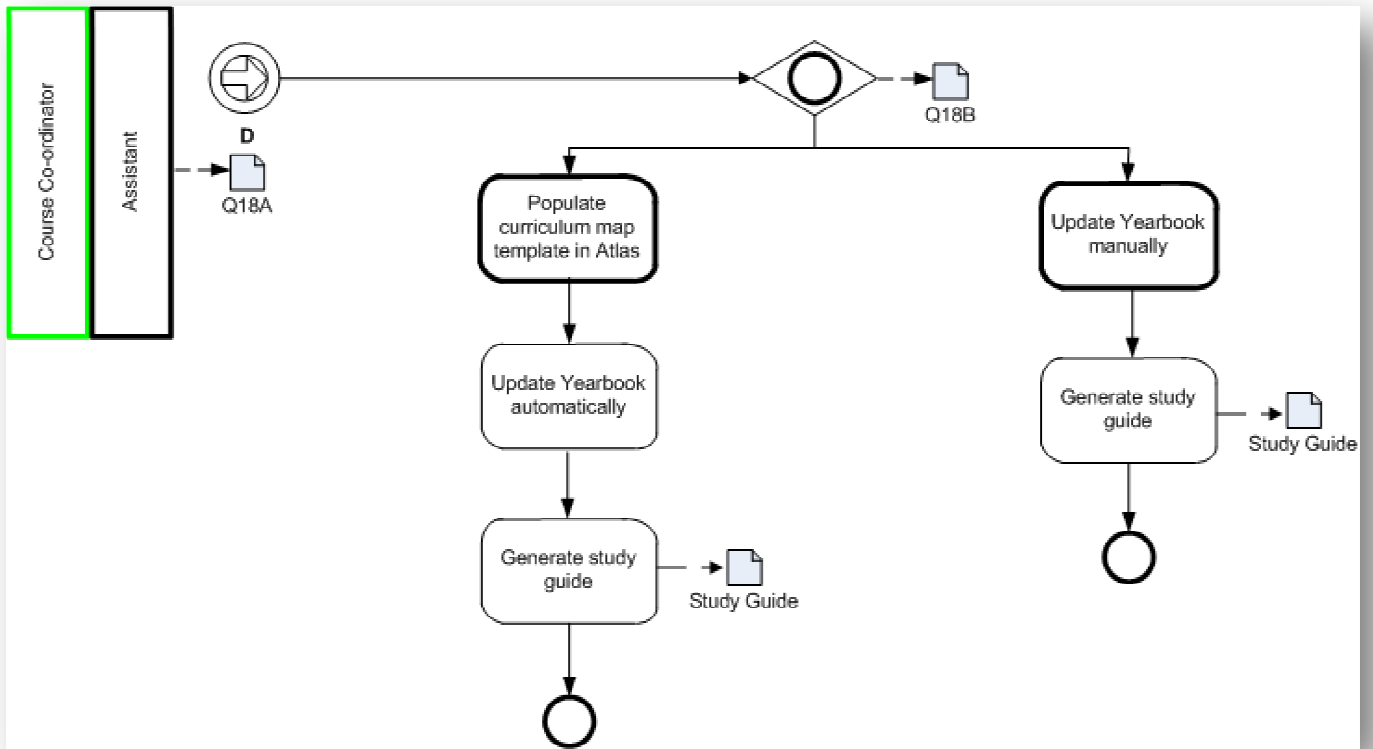


Figure 40: AS-IS Programme Amendment process (3)

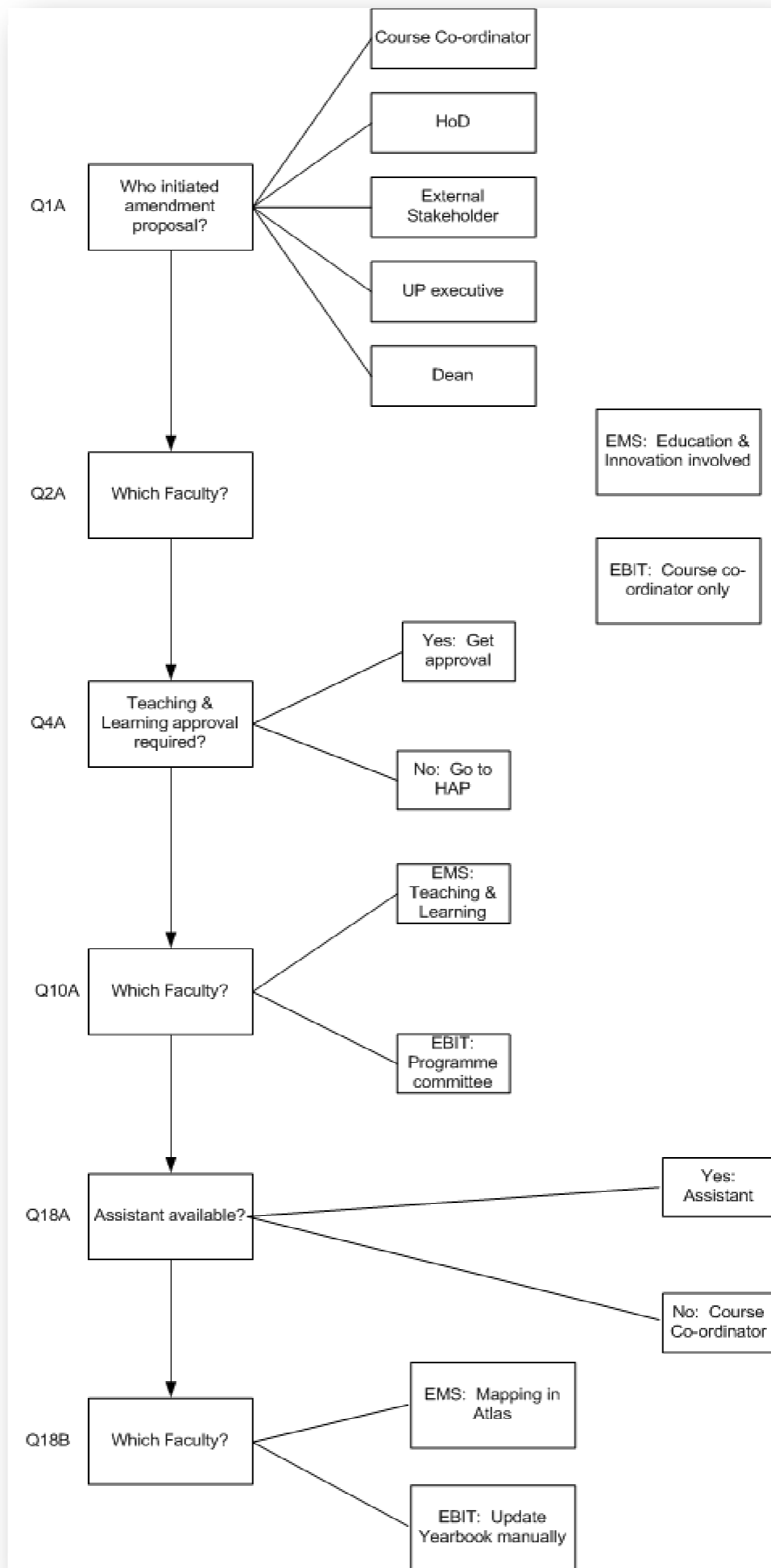


Figure 41: AS-IS Programme Amendment process Questionnaire.

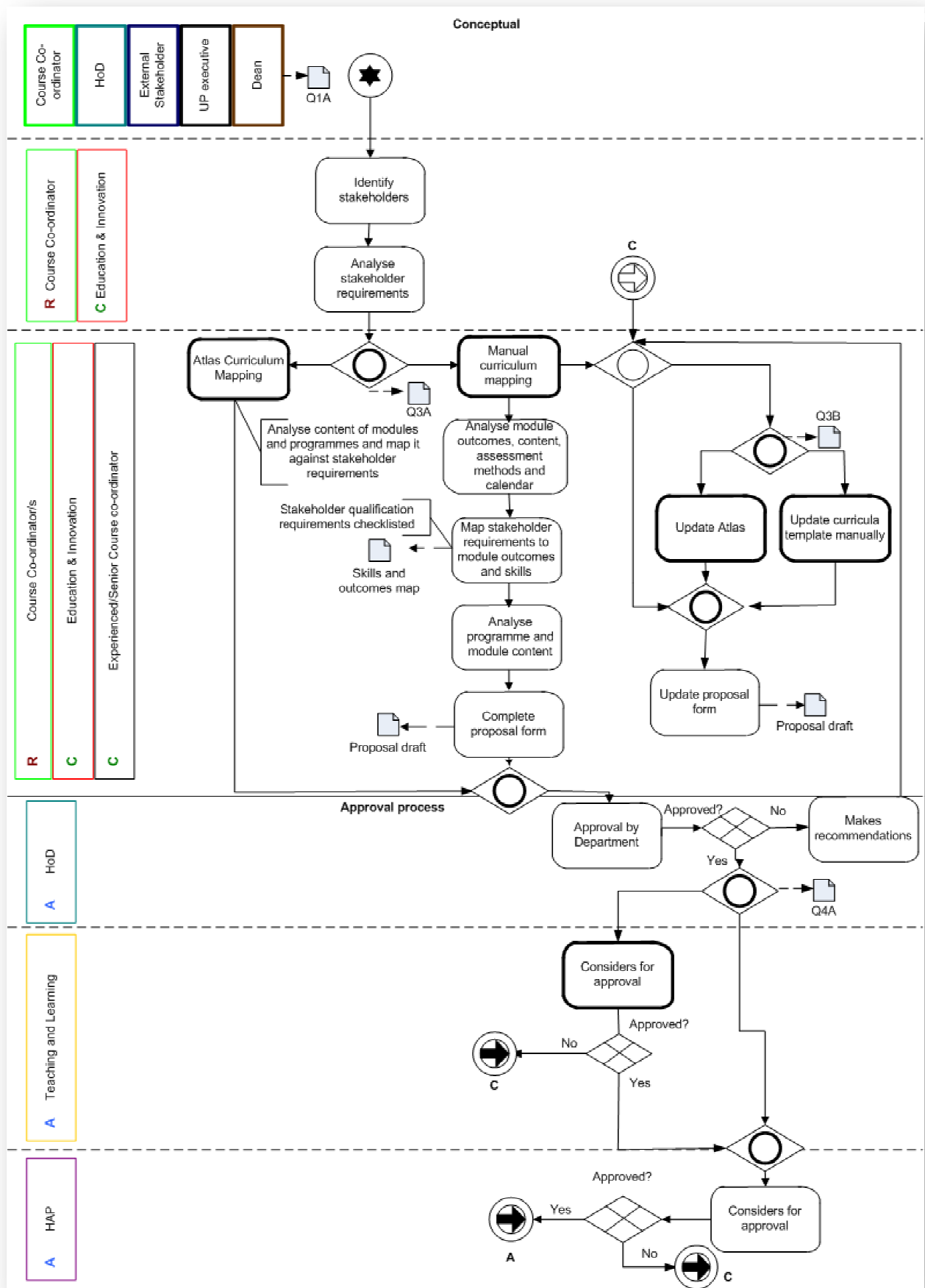
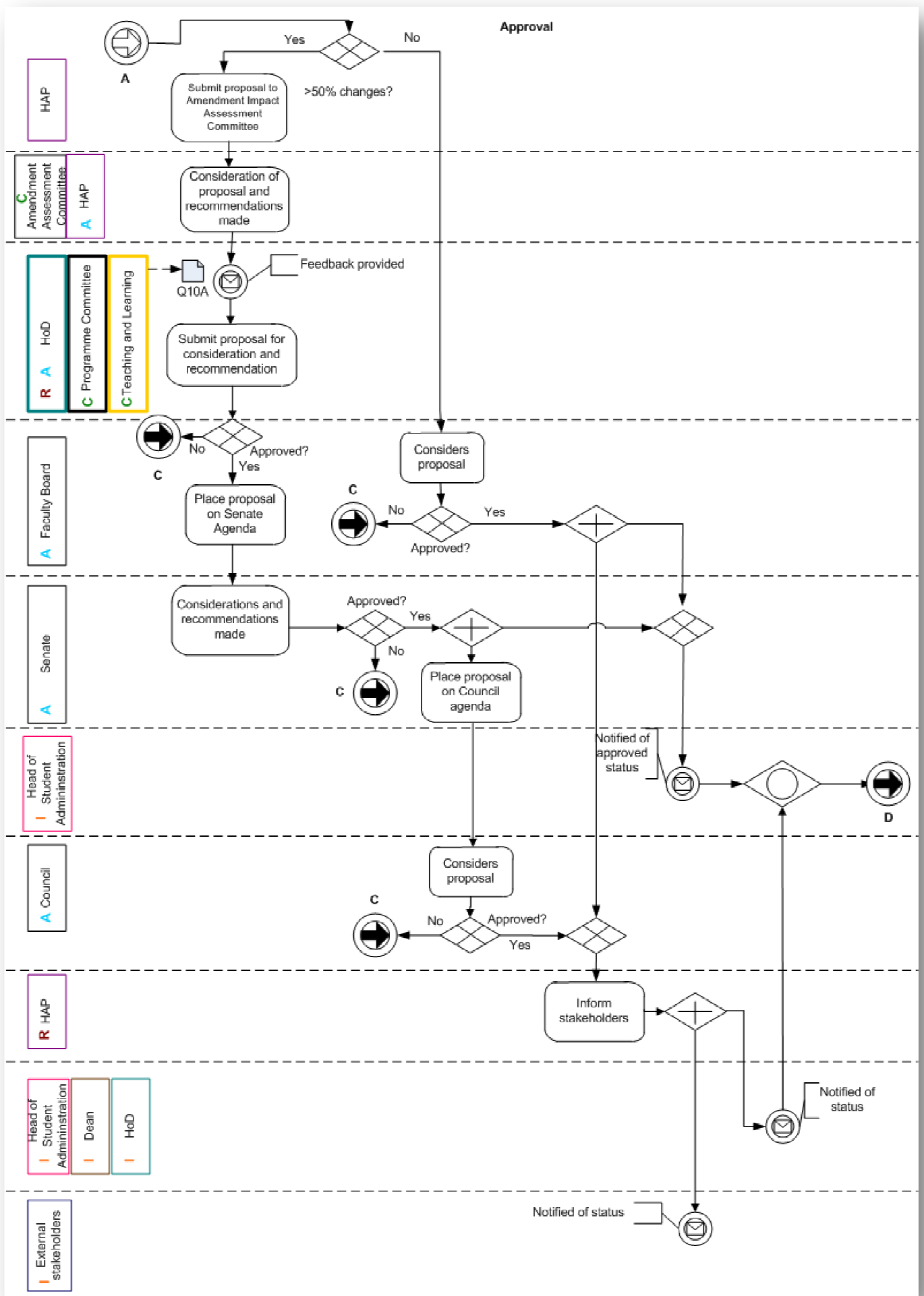
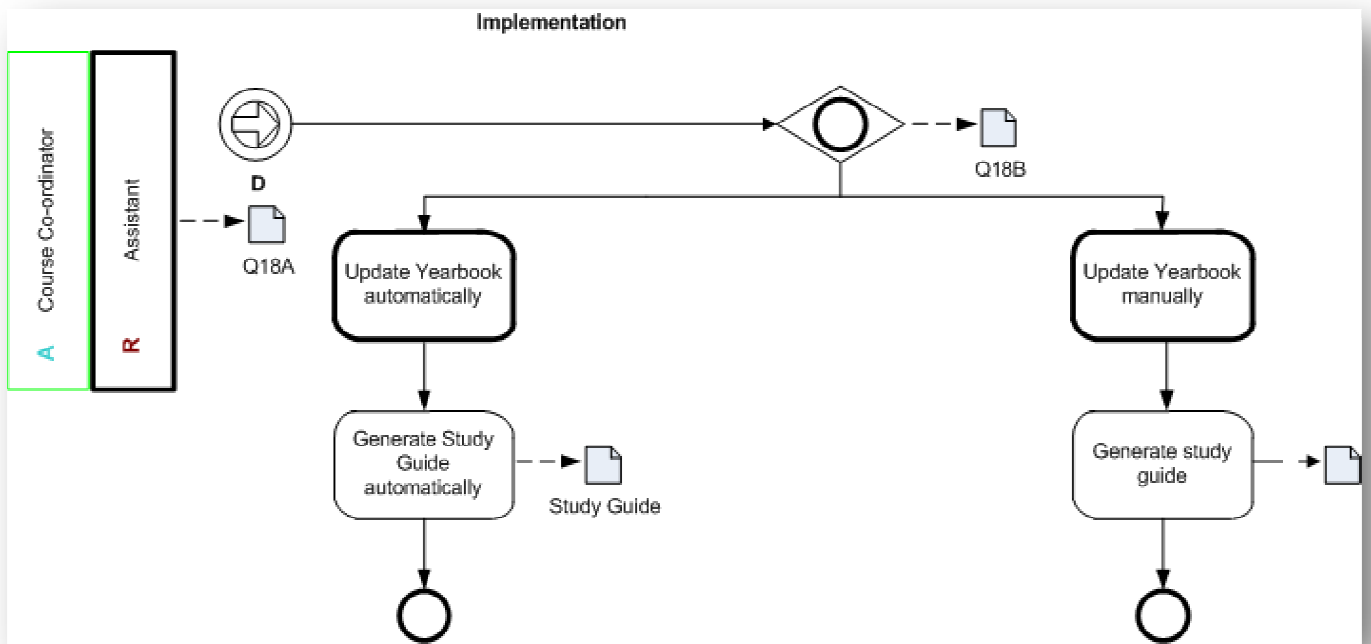


Figure 42: Recommended Programme Amendment process (1).



**Figure 43: Recommended Programme Amendment process (2).**



**Figure 44: Recommended Programme Amendment process (3).**

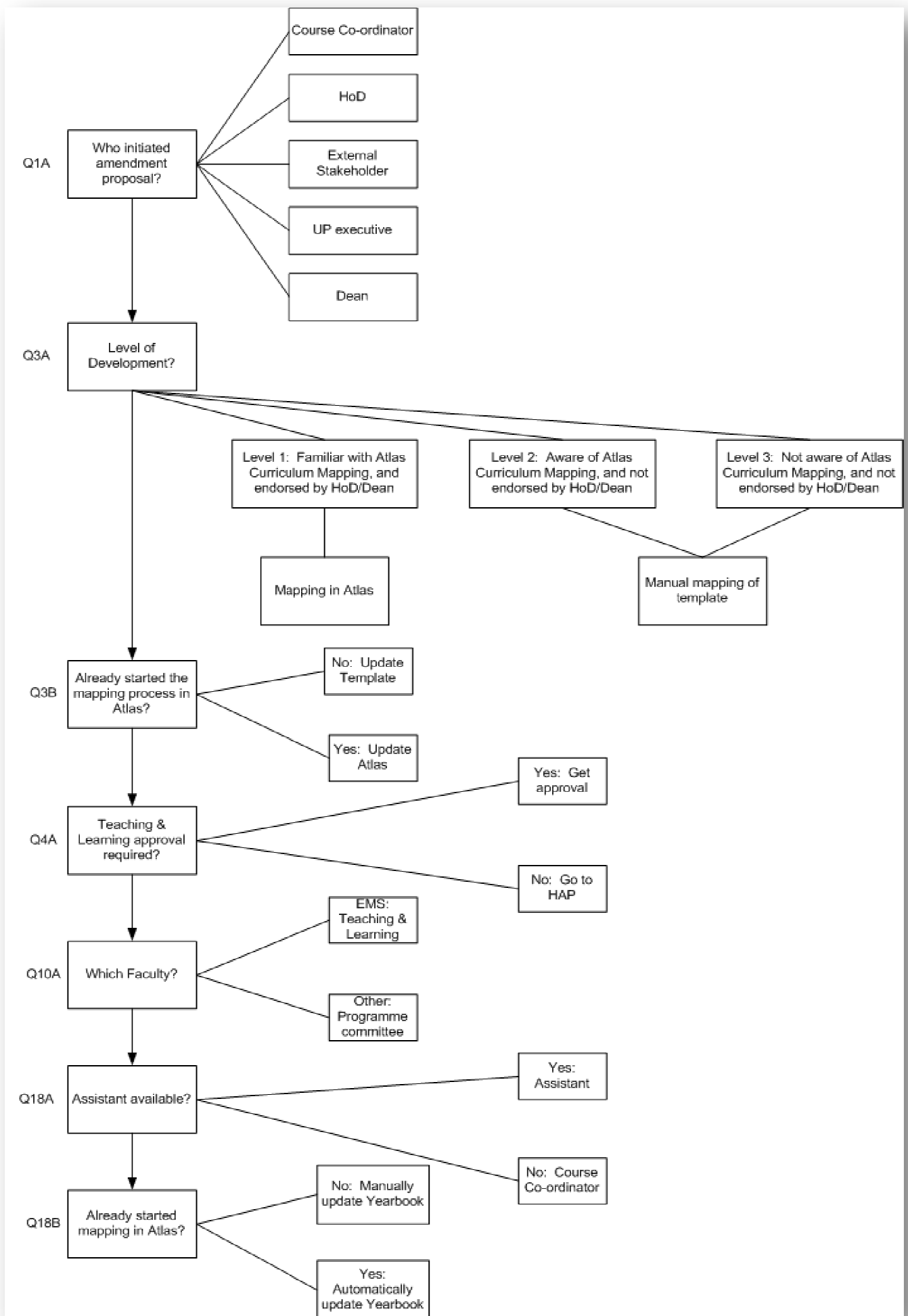


Figure 45: Questionnaire of the recommended Programme Amendment process

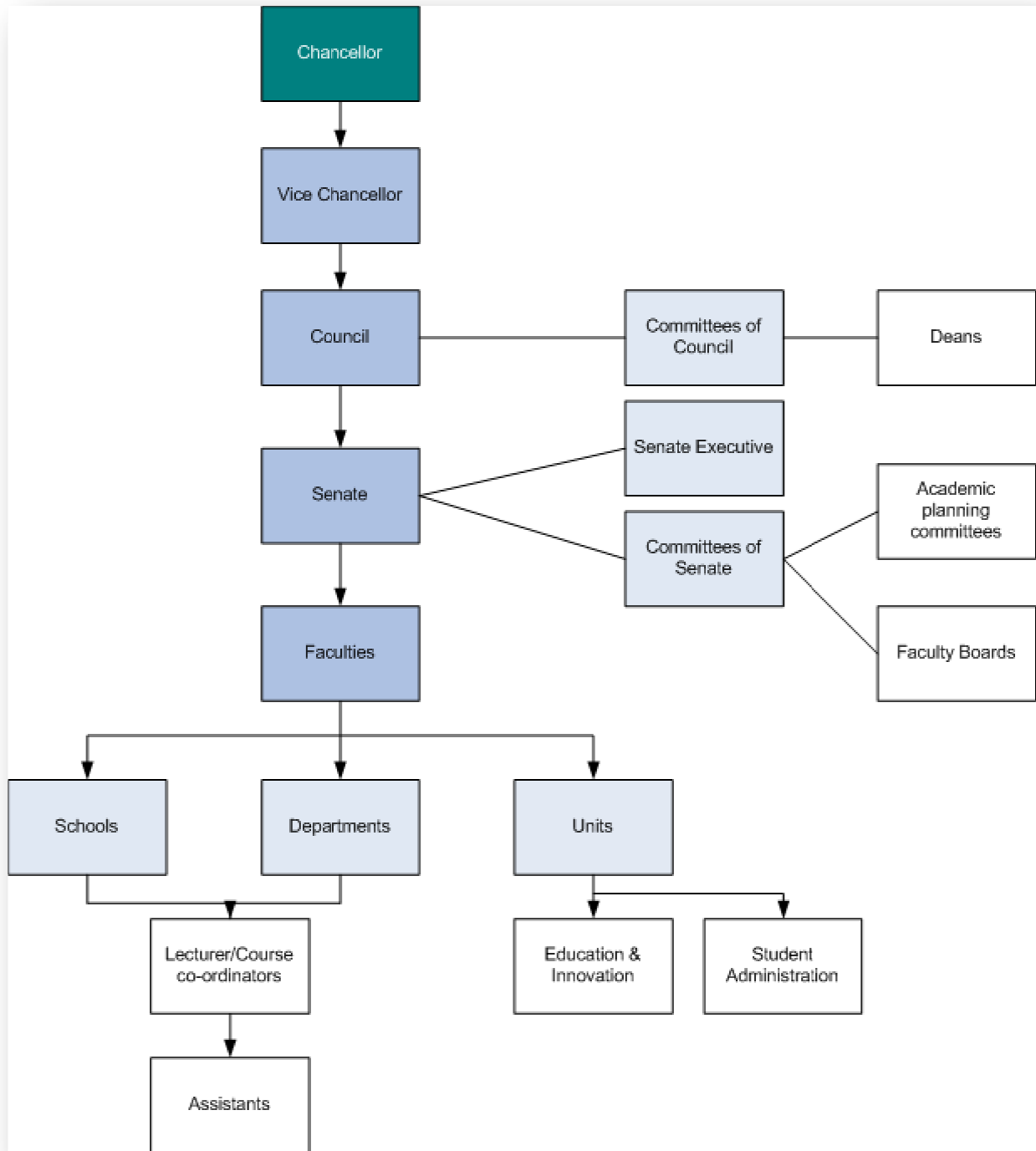


Figure 46: Organogram



<b>ROLE</b>	<b>RESPONSIBILITY</b>
<b>Chancellor</b>	Acting Head of University
<b>Vice Chancellor</b>	Management and administrative activities
<b>Council</b>	Governance and policies
<b>Senate</b>	Academic planning and research activities
<b>Course co-ordinator</b>	Management and development of module content and assessment methods (can be a lecturer as well, but need not to be)
<b>Lecturer</b>	Presentation of module content
<b>External Stakeholder</b>	Consist of professional bodies or other stakeholders such as SAQA, HEQF.
<b>Education &amp; Innovation</b>	Education consultants responsible for education innovation projects/R&D projects regarding education
<b>Experienced Lecturer</b>	Bringing forth insights on requirements and module outcomes of a programme and the interaction of modules.
<b>Programme/Teaching&amp;Learning Committee</b>	Management of Teaching & learning activities
<b>HAP</b>	Management of programmes presented and the direction the programmes are to be heading towards.
<b>Amendment Impact Assessment Committee</b>	Assessment of impacts amendments have on finances, policies, vision and mission statements and current programmes
<b>Head of Student Administration</b>	Management of all student administration regarding registration, exemptions, cancellations etc.

**Table 2: Roles and Responsibilities**

**To conclude:**

The recommended Programme Amendment process steers in the direction of a best practice for such a process at the University of Pretoria. However, more iterations and validations of this process at a wide range of different business units, at this University and possibly others, will be required in order to develop a best practice process to suit all needs. This is only the first step in developing a true best practice Programme Amendment process.

## 5.5 CONSTRAINTS OF THE PROJECT

Constraints and challenges that were faced during this project include:

- Time constraints. Limited time was available for the execution of this project as there were other academic obligations as well as time constraints of all the involved parties.
- Learning new methods.
- Limited knowledge of Enterprise Architecture and the processes at UP.
- Difficulty in obtaining the necessary information from the relevant parties.
- Difficulty in managing the freedom of academics at the University when looking for standardisation opportunities.

## 5.6 RECOMMENDATIONS

The configurable process model method provides meaningful guidance when standardisation opportunities need to be identified within any E2E process across different business units. The method proved to pose great advantages and is easily understood by non-experts.

It is highly recommended to standardise the Programme Amendment process. The University may reap benefits such as better quality programmes, healthy programmes, less time consuming amendment procedures and curriculum maps.

The recommended Programme Amendment process entails curriculum mapping, either manually or using a mapping tool such as Atlas. The mapping of a curriculum seems to be central to the management of programmes. Certain curriculum and process experts believe that curriculum mapping may become a requirement for accreditations.

## 6. CONCLUSION

The Industrial Age is in the midst of the transformation to the Information Age. To win the Information Age battle, companies must identify and standardise their core processes to be able to focus on higher priority issues such as the customer's changing needs and new business opportunities. Modern EA is not in the hands of Information Technology specialists anymore, but rather the responsibility of business specialists. Information Technology should be used in combination with business to get the competitive advantage above competitors.

Enterprise Architecture (EA) is widely used as a Business-IT alignment tool, helping companies identify their core processes and to give them the required agility to compete in the emerging market. At the University of Pretoria the knowledge and use of Enterprise Architecture is still very limited.

The project followed the EA paradigm that was created by Ross et al (2006). This paradigm entails a different approach to EA in order to create value. The first requirement of this EA approach is the Operating Model. The OM model is used to define the necessary level of process standardisation and integration of the core business processes. This is however a more intricate process than first perceived and methods for identifying standardisation opportunities are limited. This project investigated possible standardisation identification methods within different business processes at a HEI.

After some data gathering and analysis was conducted, it became clear that the Programme Amendment process within the University's Value Chain poses most potential for processes to be standardised.

A literature review was conducted to determine which methods and tools that are available to achieve the objectives of this project, using best practices, as well as case studies where similar projects were conducted. This provided enormous insight of the problem(s) at hand.

Various methods for identifying standardisation opportunities have been applied or supplemented and applied using the two theoretical Programme Amendment process models according to the Quality Unit and the EMS faculty, to validate the methods. However, it became very clear that the third method, configurable process models by La Rosa et al (2008), proved the most meaningful and suitable method for the purpose of this project. The configurable process model concept was further applied to the actual Programme Amendment processes being followed by two departments within the EMS faculty and the Industrial Engineering Department within the EBIT faculty. A recommended Programme Amendment process was delivered by these applications and incorporating any recommendations into the process.

The Programme Amendment process holds great potential to be standardised. By doing so will the quality of academic programmes presented by the University be greatly improved and maintained. It will also aid the certain programmes that are accredited by international and industry accreditation bodies, to justify their programmes and its content and thus make the accreditation process easier.

One of the deficiencies of not having documented programmes/modules associated with the current processes, will be eliminated as the proposed Programme Amendment process will provide a curriculum map. Thus can knowledge and content of a certain module be passed on to other generations of lectures. However, the benefits that would be reaped from standardising this process is still to be fully comprehended.

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APPENDIX A:  
The Vision and Mission statements of  
The University of Pretoria

# University of Pretoria: Vision and Mission

## Vision

**The University of Pretoria strives to be –**

- a leader in higher education that is recognised internationally for academic excellence and a focus on quality
- a university that is known for international competitiveness and local relevance through continuous innovation
- the university of choice for students, staff, employers of graduates and those requiring research solutions
- a university with an inclusive and enabling, value-driven organisational culture, that provides an intellectual home for the rich diversity of South African academic talent
- the premier university in South Africa that acknowledges its prominent role in Africa, is a symbol of national aspiration and hope, reconciliation and pride and is committed to discharging its social responsibilities.

## Mission

**The mission of the University of Pretoria is to be an internationally recognised South African teaching and research university and a member of the international community of scholarly institutions, that –**

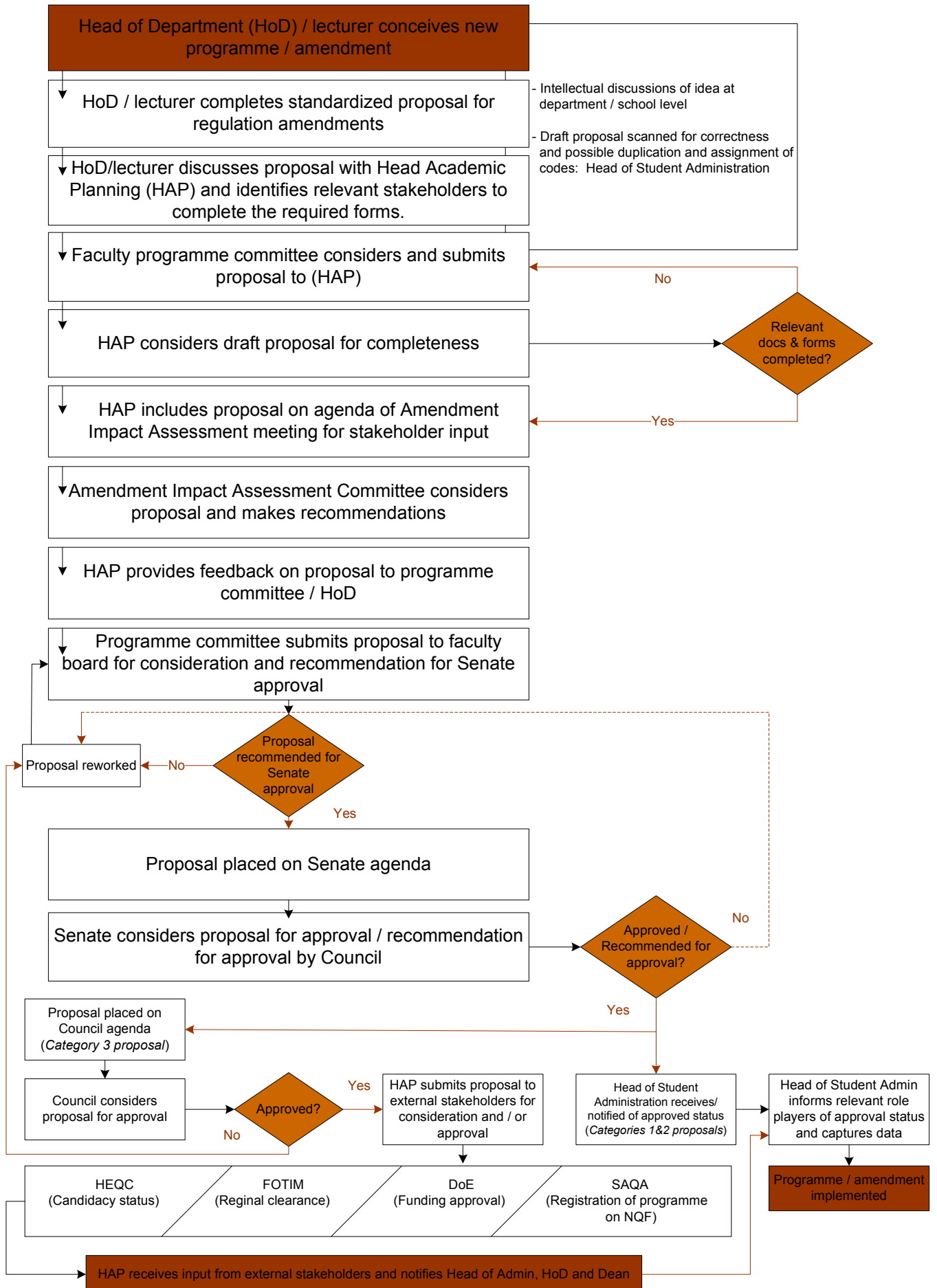
- provides excellent education in a wide spectrum of academic disciplines
- promotes scholarship through –
  - the creation, advancement, application, transmission and preservation of knowledge
  - the stimulation of critical and independent thinking
- creates flexible, life-long learning opportunities
- encourages academically rigorous and socially meaningful research, particularly in fields relevant to emerging economies
- enables students to become responsible, well-rounded, creative persons, productive citizens and future leaders by –
  - providing an excellent academic education
  - developing their leadership abilities and potential to be world-class, innovative graduates with competitive skills
  - instilling in them the importance of a sound value framework
  - developing their ability to adapt to the rapidly changing environments of the information era



- encouraging them to participate and excel in sport, cultural activities and the arts
- is locally relevant through –
  - its promotion of equity, access, equal opportunities, redress, transformation and diversity
  - its contribution to the prosperity, competitiveness and quality of life in South Africa
  - its responsiveness to the educational, cultural, economic, scientific, technological, industrial, health, environmental and social needs of the country
  - its active and constructive involvement in community development and service
  - its sensitivity to the demands of our time and its proactive contribution towards shaping the future
- creates an intellectually stimulating and culturally vibrant, pleasant and safe environment in which its students and staff can flourish
- is committed to effective, efficient, caring and innovative approaches to teaching, research and community service, client-centred management and administration and good governance.

## APPENDIX B: Programme Amendment process

# New programme and regulation amendment process



APPENDIX C:  
Standard Regulation Amendment Form

STANDARD FORMAT OF PROPOSALS FOR REGULATION AMENDMENTS

University of Pretoria  
Faculty  
School  
Department

Date:

HEADING

**For example:** PROPOSAL FOR CHANGING/INTRODUCTION/DISCONTINUATION (whatever the case may be) OF ..... (the description should be concise but clear in order to be used as an agenda item in the faculty board agenda – e.g. do not merely mention a programme or module name).

1. PROBLEM STATEMENT AND MOTIVATION

- Provide detailed reasons for the proposed introduction/discontinuation/change, etc.
- Where applicable, indicate whether other faculties have been consulted.

2. PROPOSAL

- It is proposed for consideration that: for example module X be replaced with module Y; or that the content of module X be changed.

3. FINANCIAL IMPLICATIONS

- Mention all financial implications that are foreseen. If no implications, explicitly explain 'None' in the document.
- Note: Financial implications should be discussed with BIRAP

4. TIMETABLE AND SPACE IMPLICATIONS

- Mention the timetable implications of the proposal, even if it is the discontinuation of a subject or module. State whether the relevant timetable official was consulted to determine whether there will be any timetable implications. If no implications, explicitly explain 'None'
- Mention any space implications of the proposal, e.g. the need for space in existing laboratories, etc. and how it will be provided. If no implications, explicitly explain 'None'.

5. STAFF IMPLICATIONS

- Mention any staff implications of the proposal. In cases where new modules are introduced, the name of the staff responsible for presenting the proposed modules, must be indicated. If no implications, explicitly explain 'None'.

6. TRANSITIONAL MEASURES

- Indicate the transitional measures that will apply when the curriculum of a programme is modified by for instance the rearrangement of modules from one year of study to another, the replacement of modules with other modules or changing the pass or cum laude requirements.

7. YEARBOOK IMPLICATIONS

**NB Please supply the information needed here in English and Afrikaans.**

- Indicate clearly where in the yearbook the insertion, deletion or change is to be made – mention the specific regulation e.g., Reg.P(d)(iv) – do not merely indicate by means of page numbers.
- Use hyphenation to indicate deletions.
- Use underscore to indicate insertions.

Important:

- Mention all other faculties where the module is also used and indicate how they have been consulted, otherwise the new or amended rule may be omitted from their calendars.

The module description needs to be added to the Course Catalogue for 2011 as follows:

**Code 000**

**Academic organisation:**

**Prerequisite:**

**Contact time:** ? lpw

**Period of presentation:** Year/semester

**Language of instruction:**      **Credits:**

**Module content:**

**Module name**

*Comprehensive paragraph*

***Undertaking***

*This proposal has followed all the relevant internal faculty-specific processes (other departments/faculties have been consulted where necessary) and can be placed on the Agenda as a Section B proposal.*

**Dean:** \_\_\_\_\_

**Date:** \_\_\_\_\_

APPENDIX D:  
The BPMN elements and the usage thereof

# BPMN ELEMENTS (diveintobpm, 2010)

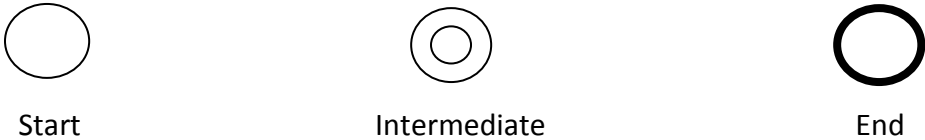
BPMN was designed to be a simple mechanism to create complex business processes. One approach satisfy both of these conflicting requirements was to organise the notation into specific categories. The BPMN notation is divided into four basic categories namely:

- Flow Objects
- Connecting Objects
- Swimlanes
- Artifacts

## FLOW OBJECTS

The Flow Objects consist of three core elements to ease the user in learning and recognising different shapes, these are:

- **Events:** This symbol represents a trigger or a result during the business process. Events triggers something to happen or is a result of something that already occurred and thus affects the flow of the process. Below are the three types of events. These events are then further categorized to indicate the nature of event. This is shown in figure D-1.



Events				
	"Catching"		"Throwing"	
Message				
Timer				
Error				
Cancel				
Compensation				
Conditional				
Link				
Signal				
Terminate				
Multiple				

Figure D 1: Nature of events

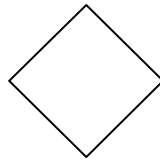


- **Activity:** Activities describes the work that is performed and consist of Tasks or Sub processes. A Task is represented by a rounded-corner rectangle whereas a sub-process is represented by the same shape with a small plus sign in the bottom centre which can be seen below.



Task

- **Gateway:** This symbol is responsible for divergence or convergence of the sequence flow. It is generally used for decisions, forking, merging or joining of paths. Internal markers indicate the type of control. A gateway takes on the shape of a diamond as shown below.



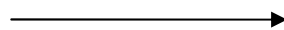
Gateway

The gateways are also further categorized to indicate the nature of the gateway. The categories are Exclusive data and event based, Inclusive, Complex or parallel.

## CONNECTING OBJECTS

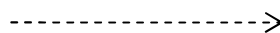
These objects create the flow of the process and indicate how all of the elements are connected. There are three connector types and these will be discussed below. The types are:

- **Sequence Flow:** This connector indicates the sequence in which the activities occur. It is represented by a solid line and solid arrowhead as seen below.



Sequence Flow

- **Message Flow:** This connector indicates the flow of messages between two different Process Participants. Message Flow connectors must only be used to indicate the flow of messages between different pools (Process Participants are represented by pools and these will be discussed later as part of swimlanes). A Message Flow connector is represented by a dashed line followed by an open arrowhead as indicated below.



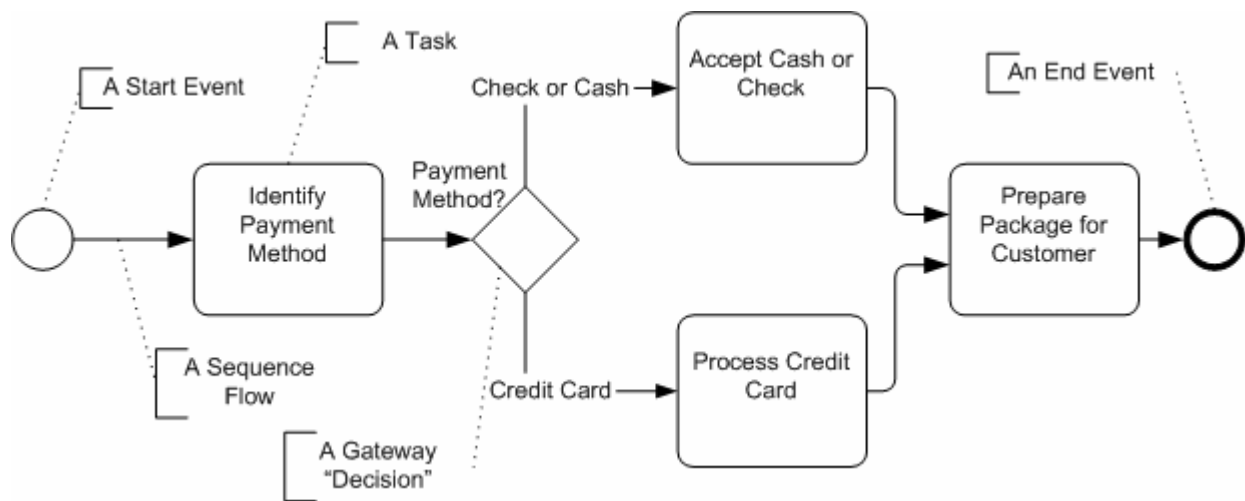
Message Flow

- **Association:** The purpose of this connector is to indicate the associations between data, text or artefacts with flow objects. These can also be used in conjunction with Artifacts to show inputs and outputs of activities.

Association connectors are illustrated by means of a dotted line with a line arrowhead, which is shown below.



The core elements together with the connectors will be sufficient for users who requires low level precision used for documentation or communication purposes. Figure C-1 below is an example of a low level, easy understandable diagram. For a higher level of precision process models which may be required for detailed analysis or management, additional detail can be added to the core elements. A diagram representing a higher level precision model is shown in the Figure C-2.



**Figure C-1: An example of a simple business process, (White, 2004, p.3).**

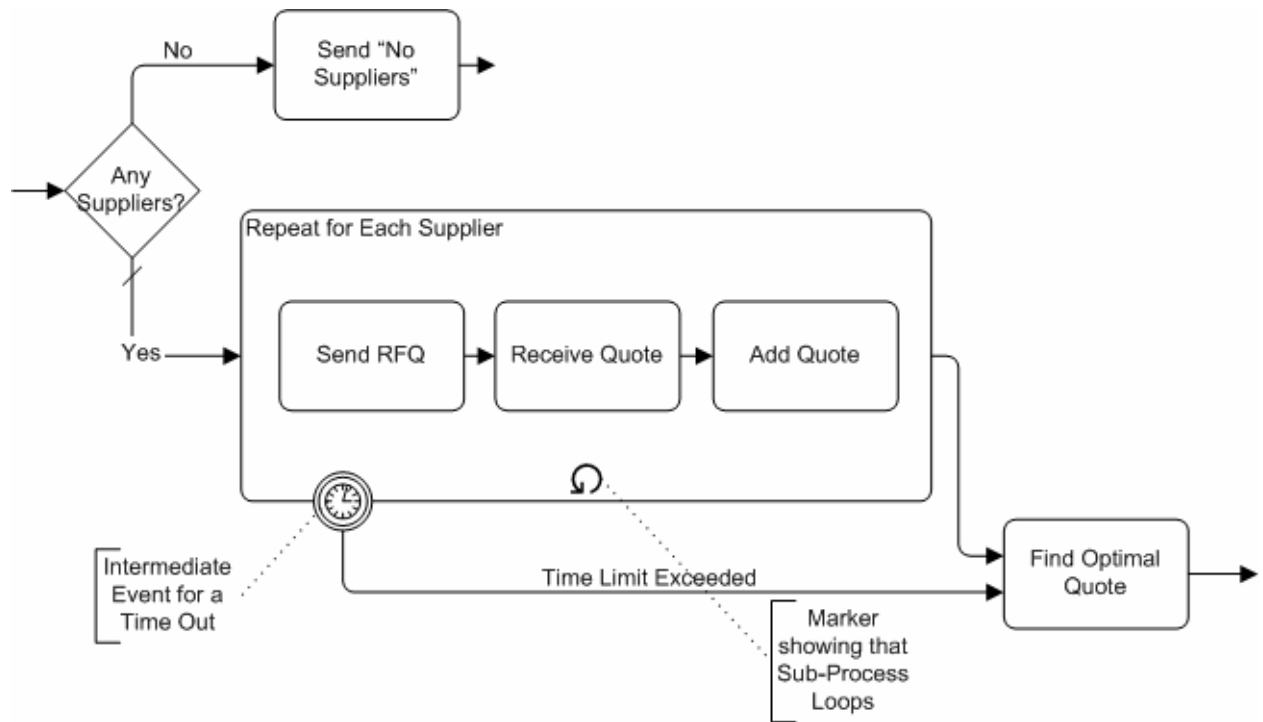


Figure C-2: A higher level of precision process model, (White, 2004, p.4).

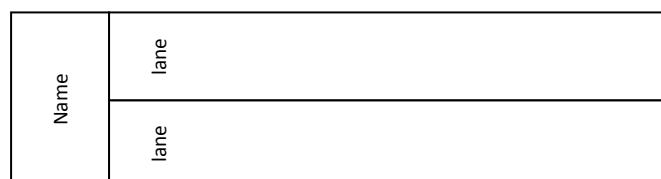
## SWIMLANES

BPMN uses swimlanes to categorize the activities into different functional capabilities or responsibilities and thus making more complex models visually organized. Swimlanes are supported by BPMN with two main constructs, which are:

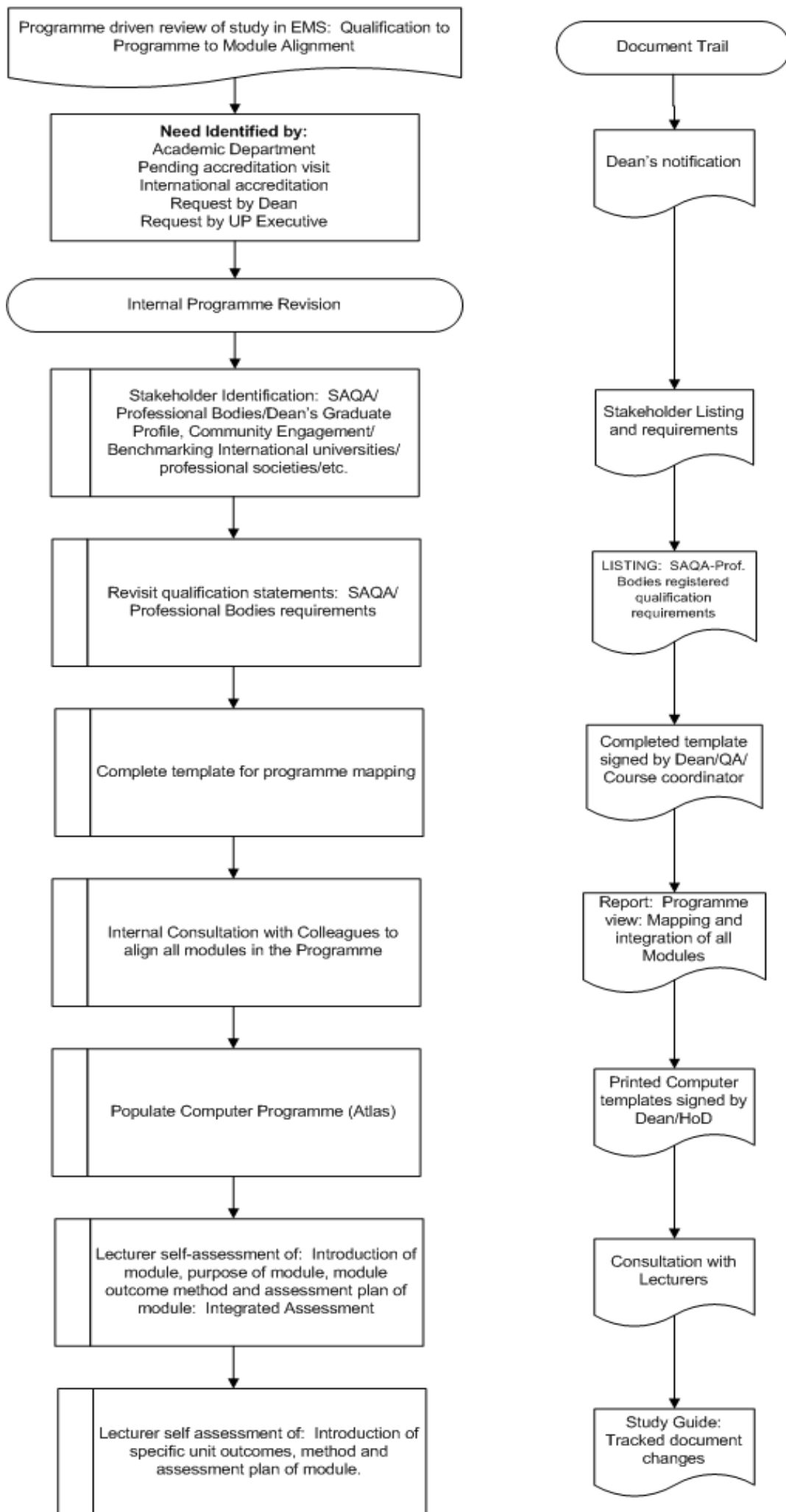
- **Pools:** This represents Participants in a Process as well as to partition sets of activities from other pools. Pools are illustrated by a rectangle which is drawn over the relevant activities, as shown below.



- **Lanes:**



APPENDIX E:  
Programme Amendment process at the  
EMS department



**APPENDIX F:**  
**An extraction of the 2010 Economic and Management Sciences  
Yearbook**

## C.22 BACHELOR OF ADMINISTRATION (B.ADMIN)

### (a) Fields of specialisation

Public Management (07131171)

[Option: Public Administration] (07131172)

International relations (07131151)

### (b) Duration

Three years.

## C.23 Curriculum for BAdmin in Public Management (Code 07131171)

This programme is directed towards the study of Public Administration that will equip the candidate for a career in the broad public sector. Candidates will gain in-depth knowledge of certain administrative and management practices in the South African and international public sectors. Emphasis is placed on the three spheres of government with reference to aspects such as resources management, international administration and management, policy, accountability and ethics, the role of the state, intergovernmental relations and administrative justice.

**Package coordinator:** Prof PA Brynard, EM 3-114, Tel: 012 420 3403

**Total credits required:** 377

	Year-level 1	Year-level 2	Year-level 3
	Credits	Credits	Credits
Fundamental modules	20	0	0
Core modules	79	32	40
Elective modules	30	96	80*
<b>Total</b>	<b>129</b>	<b>128</b>	<b>120</b>

**\* Only two 14-week modules, or the equivalent thereof, that are not preceded by the 100- and 200-level modules, may be taken for degree purposes.** In other words, at least four 14-week modules must be taken at 300-level that are preceded by the 100- and 200-level except for the modules offered at 200- and 300-level only, for example Financial management (FBS 210, 220, 310 and 320).  
Economic and Management Sciences 2010

### Learning programme

YEAR LEVEL:	1	2	3
<b>Fundamental modules (Compulsory)</b>			
CIL Computer and information literacy	111§,	121	
EOT Academic literacy§	110,	120	

§ If a student does **NOT** pass the Academic Literacy Test at the beginning of the year, he/she must register for and pass EOT 110 and EOT 120 and will then obtain 12 credits for these modules. A student who passes the Academic Literacy Test, will be exempted from EOT 110 and EOT 120 and has to pass a credit value of 12 from any other language modules offered by the University (also consult the paragraph *Medium of*

Instruction on page 10).

**Core modules (Compulsory)**

PAD	Public Administration	112, 122	212, 222	312, 322
PTO	Politics	111, 120		
EKN	Economics	110		
BDO	Industrial and organisational Psychology	110, 120		
KOB	Communication management	184		

**Elective modules**

STL	Political science(8)		210, 220	310, 320
<b>Or</b>				
IPL	International relations(8)		210, 220	310, 320
EKN	Economics	120	214, 224	310, 320 314
OBS	Business management	114, 124	210, 220	310(1), 320
BDO	Industrial and organisational Psychology		219, 229 319(1), 329(1)	271, 272 371, 372
FRK	Financial accounting(2)	111, 121	211(7), 221(7)	311(7), 321(7)
INF	Informatics	181(3)		
BEL	Taxation		220(7)	
BER	Business law		210, 220	
STK	Statistics	110, 120 113, 123(4)		
INF	Informatics	112	214, 261 225	
AFR	Afrikaans	110, 120 114, 124		
SRG	Constitutional law		210, 220	
ADR	Administrative law			310(5)
RVW	Legal Interpretation		210	
ABR	Labour law			311(6)
ABV	Labour relations			320(6)
KOB	Communication management		210, 220	310, 320

**Note: See Regulation C.2 for prerequisites of all modules.**

⌘ Students may write the exemption examination for CIL 111 only once.

(1) OBS 310 and BDO 319, 329 may not be included in the same curriculum for degree purposes.

(2) See Reg 1.2 (d).

Economic and Management Sciences 2010

(3) INF 181 is a 14-week module that is offered in the first as well as the second semester.

Compulsory module if FRK 111 and 121 are chosen as electives.

(4) On its own, STK 113 and 123 will not be recognised for degree purposes, but in this Faculty, exemption will be granted from the grade 12 Mathematics admission requirement (i.e. at least 3 (40-49%) and STK 110.



- (5) Elective module only at 200 level, not at 300 level.
- (6) Can be included in the curriculum as elective modules at 200 level, provided that it can be accommodated in the class, test and examination timetables; may not be taken together with SRG 310, 320 as 300-level modules.
- (7) Taxation 220 (BEL 220) is compulsory at 200-level, if Financial accounting 311, 321 (FRK 311, 321) is chosen.
- (8) STL and IPL have no modules at year-level 1, but follow on PTO 111 and PTO 120.

**Please note:** Candidates who did not obtain at least 3 (40-49%) in Mathematics in Grade 12, or who did not pass Statistics 113, 123, may not include the underlined modules in their curriculum.

**Specialisation modules:** PAD 312, 322

## APPENDIX G: Background on Quality Unit

## **Background of The Quality Unit at UP**

The Quality Unit of the University is a support service, currently setting out the strategic plans of the University (Le Roux, 2008). This unit is responsible for two aspects of quality. The first is Quality Assurance, where the core processes at the university is maintained. The other aspect is Quality Promotion. This aspect entails improvement plans which identify gaps in institutional problems and addresses them (North, 2010).

In 2008 the Higher Education Quality Committee (HEQC) published an institutional Audit Report, after a site visit to UP took place. The Quality Unit was given instructions to create an improvement plan to address the problems in the Audit Report. Thus, the unit is currently involved with an Information Audit project, which addresses the student life cycle processes among others (Kellerman, 2009). UP's vision and mission statements are shown in Appendix A, as UP's vision and mission is important when developing improvement plans and thus part of the data gathering process.

This unit provides graphical representations of each internal client's core processes, of which the New Programme Regulation and Amendment process is a part of. These core processes are support the national and international accreditation applications (Le Roux, 2008).

## APPENDIX H: UP's Governance structures

## University of Pretoria governance structures

Chancellor	<ul style="list-style-type: none"> <li>- Titular Head of the University</li> <li>- Term of office five years</li> </ul>
Vice-Chancellor and Principal	<ul style="list-style-type: none"> <li>- Chief Executive and Accounting Officer</li> <li>- Responsible for management and administration of the University</li> <li>- Chairperson of Senate</li> <li>- Term of Office five years</li> </ul>
Council	<ul style="list-style-type: none"> <li>- Responsible for Governance, policy making &amp; monitoring (30 members)</li> <li>- One meeting per semester</li> </ul>
Committees of Council	<ul style="list-style-type: none"> <li>- Standing Committee of Council</li> <li>- Audit Committee</li> <li>- Human Resources Committee</li> <li>- Investment Committee</li> </ul>
Senate	<ul style="list-style-type: none"> <li>- Responsible for academic planning and research matters</li> <li>- One meeting per semester</li> </ul>
Senate Executive	<ul style="list-style-type: none"> <li>- Vice-Chancellor and Principal</li> <li>- Vice Principals</li> <li>- Executive Directors</li> <li>- Deans of Faculties</li> <li>- Directors of Support Divisions</li> <li>- Registrar (Secretary of Senate Executive)</li> <li>- Chairpersons of committees of Senate</li> <li>- and others</li> </ul>
Committees of Senate	<ul style="list-style-type: none"> <li>- Senate Executive</li> <li>- Academic Planning Committee</li> <li>- Timetable Committee</li> <li>- Disciplinary Committee</li> <li>- Faculty Boards</li> <li>- Appeals Committee of Senate</li> <li>- Committee for Research</li> <li>- Committee for Admission, Evaluation and Academic Support</li> <li>- Committee for Student Life</li> <li>- Committee for Student Cases</li> <li>- Language Policy Committee</li> <li>- Committee for Academic matters at Mamelodi campus</li> <li>- Appointment Selection Committee</li> </ul>
Faculties/Schools/Departments/Units	<ul style="list-style-type: none"> <li>- the Faculty Board of each Faculty is a Committee of the Senate</li> </ul>
Institutional Forum	<ul style="list-style-type: none"> <li>- Implementation of Act &amp; national policy on Higher Education</li> <li>- Formulation of race &amp; gender equity policies etc.</li> </ul>
Convocation	<ul style="list-style-type: none"> <li>- One meeting at least once every five years</li> </ul>

**APPENDIX I:**  
**Research Consent Forms**

**APPENDIX J:**  
**Ethical Clearance Approval Form**