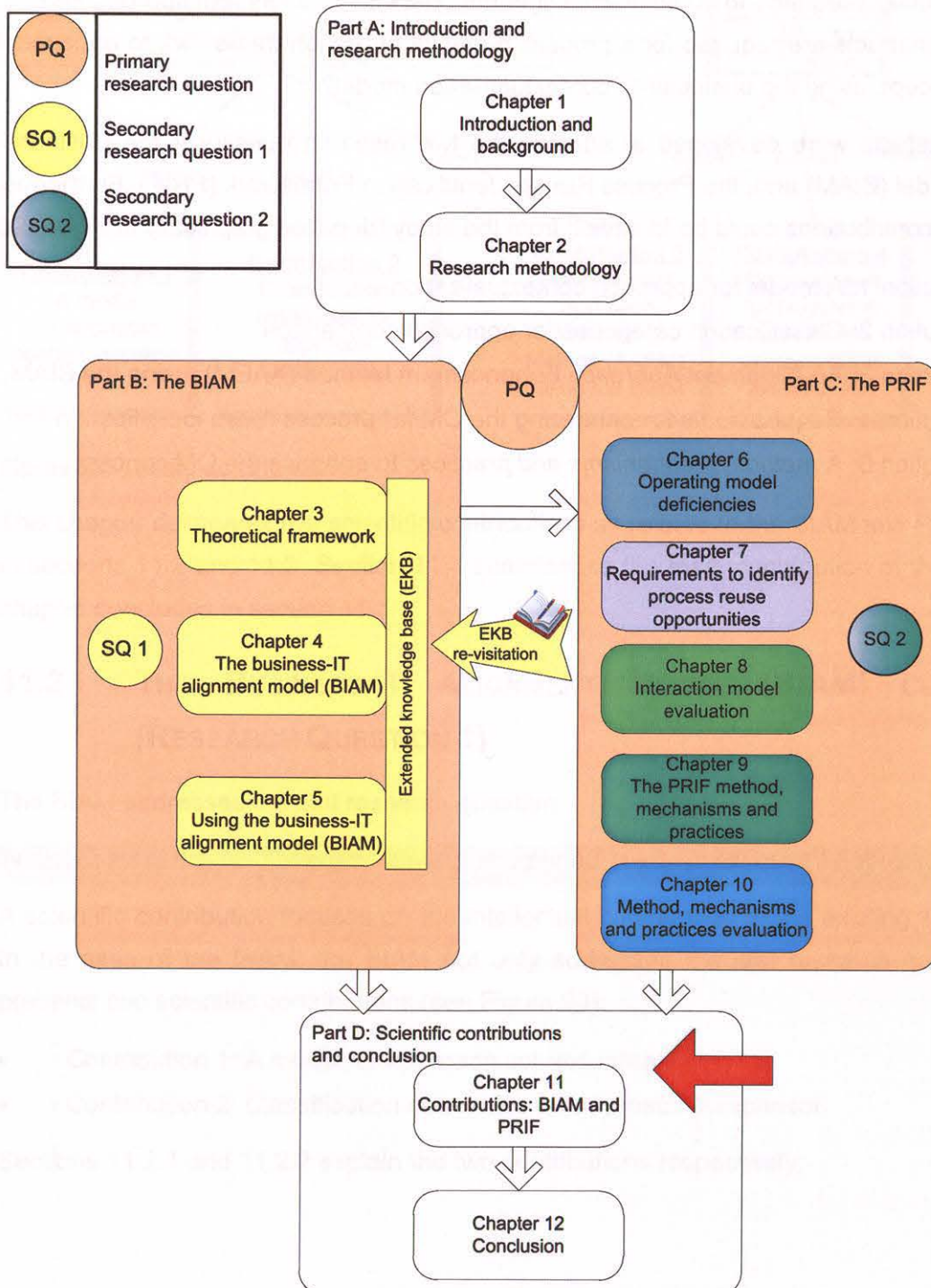


PART D: SCIENTIFIC CONTRIBUTION AND CONCLUSION

The act of discovery consists not in finding new lands but in seeing with new eyes. ~ Marcel Proust

Part D, the final part of this thesis, contains Chapters 11 and 12 to discuss the contributions and final conclusions:

- Chapter 11 presents five contributions extracted from the BIAM and PRIF.
- Chapter 12 delineates the thesis findings and recommendations for further research.



Chapter 11. Contributions: BIAM and PRIF

11.1 INTRODUCTION

The main contribution of this study could be summarised as the *enhancement of the OM concept*, which is facilitated by a *business-IT alignment contextualisation model*. This study answered the main research question, by addressing two secondary questions:

1. What model is required to contextualise different business-IT alignment approaches?
2. What constructs are required for a process reuse identification framework to enhance the OM concept, using the business-IT contextualisation model?

Two main artefacts were developed to address the two research questions: the Business-IT Alignment Model (BIAM) and, the Process Reuse Identification Framework (PRIF). Furthermore, five scientific contributions could be identified from the study (depicted graphically in Figure 90):

- Contribution 1: A model for approach contextualisation
- Contribution 2: Classification categories for approach comparison
- Contribution 3: An Alignment Approach Enhancement Method (AAEM), using the BIAM
- Contribution 4: Requirements for enhancing the OM for process reuse identification
- Contribution 5: A *method, mechanisms and practices* to enhance the OM concept

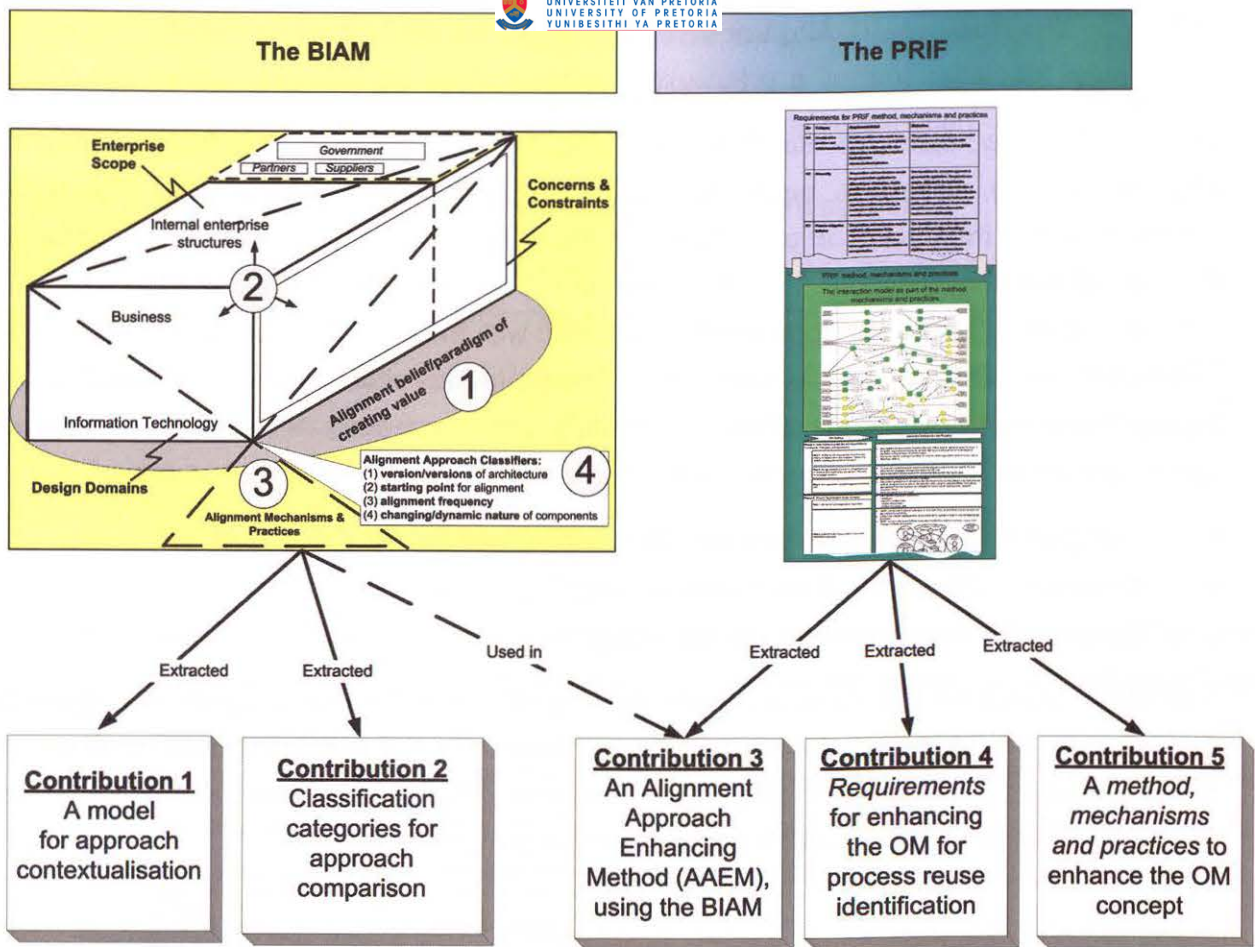


Figure 90: Thesis contributions

This chapter delineates five scientific contributions as related to the BIAM and PRIF respectively in sections 11.2 and 11.3. Section 11.4 summarises the main contribution of this study and the chapter concludes in section 11.5.

11.2 THE BUSINESS-IT ALIGNMENT MODEL (BIAM) CONTRIBUTIONS (RESEARCH QUESTION 1)

The BIAM addresses the first research question:

What model is required to contextualise different business-IT alignment approaches?

A scientific contribution focuses on the intellectual contribution to the existing knowledge base. In the case of the BIAM, the BIAM not only addresses the first research question, but also presents two scientific contributions (see Figure 90):

- Contribution 1: A model for approach contextualisation
- Contribution 2: Classification categories for approach comparison

Sections 11.2.1 and 11.2.2 explain the two contributions respectively.

11.2.1 The Business-IT Alignment Model (BIAM) for contextualisation

The BIAM provides a scientific contribution since the BIAM partially addresses the fragmentation that exists in literature pertaining to three emerging disciplines, enterprise engineering (EE), enterprise architecture (EA) and enterprise ontology (EO). The current irregularities and fragmentation of literature on the *three disciplines*, creates misunderstanding and limited use/consolidation of existing literature (Lapalme, 2011). Created inductively from current theoretical alignment approaches associated with the disciplines of EE, EA and EO, the BIAM provides a common frame of reference. The BIAM thus circumvents the irregularities and fragmentation that exists in literature, by providing a common analysis model to *understand* a current alignment approach in terms of *three questions*:

- Question 1: *Why* should the enterprise use the proposed approach to align?
- Question 2: *What* should the enterprise align?
- Question 3: *How* should the enterprise align?

The BIAM addresses the three questions by way of four alignment components (Figure 91, Components 1 to 4). As a scientific contribution (extending the existing knowledge base), the BIAM provides a business-IT alignment perspective to analyse and understand current alignment approaches in terms of the four alignment components.

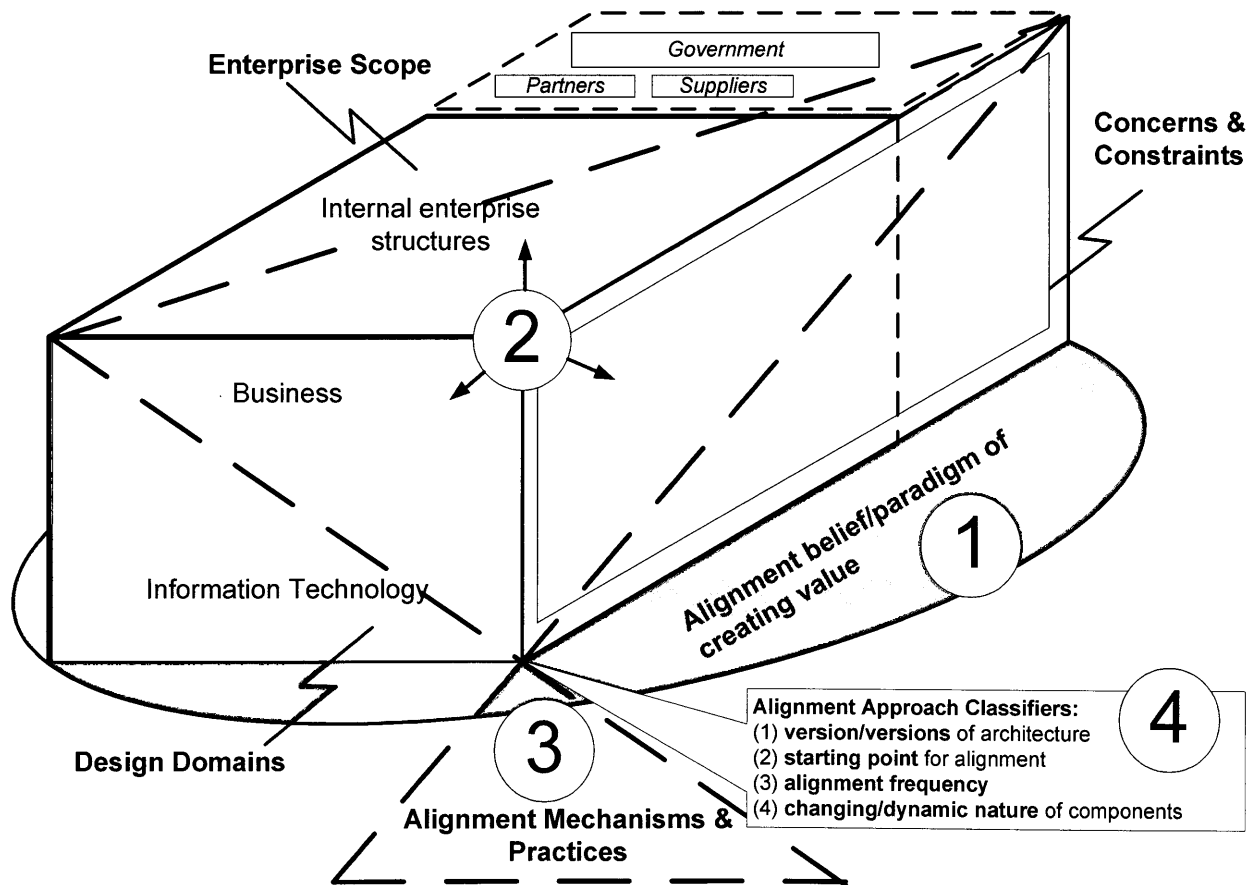


Figure 91: The BIAM (duplicate of Figure 45)

Since the interpretation of every component of BIAM has already been discussed in section 4.3.2, this section extracts the *method for contextualising* a current alignment approach, and concludes with prospective *users* of the BIAM as an additional contribution.

11.2.1.1 Method for contextualising a current alignment approach

The order of the BIAM components is meaningful, indicating an underlying *method-sequence* to contextualise current alignment approaches in terms of the BIAM components:

1. Analyse the *alignment belief/paradigm of creating value*, (Figure 91, *Component 1*).
2. Identify the alignment *dimensions* that explicate the extent of alignment (Figure 91, *Component 2*):
 - Identify explicit demarcation/separation of *design domains* (Figure 91, *Component 2, front pane*) used to classify *architecture descriptions*.
 - Identify *concerns and constraints* (Figure 91, *Component 2, side pane*) that are explicated by the alignment approach, addressed during design/alignment of multiple *design domains*.
 - Identify *enterprise scope* (Figure 91, *Component 2, top pane*), explicating the *structural alignment elements* (e.g. business units, lines of business, departments etc., abstract or real) that need to be aligned via the alignment approach.
3. Identify *alignment mechanisms and practices* (Figure 91, *Component 3*), which provides other means/ways to support alignment across the *design domains, concerns & constraints*, and *enterprise scope*. Use the ten categories of *alignment mechanisms and practices* provided in section 5.3.3 as a starting point, and add more if the ten categories are insufficient.
4. Analyse the alignment approach in terms of the four *alignment approach classifiers* (Figure 91, *Component 4*).

As evidence of this scientific contribution, this thesis described examples of BIAM-contextualisations for four alignment approaches where this method was followed:

1. The Zachman approach (see section 5.2)
2. The Open Group approach (see section 5.3)
3. The *foundation for execution* approach (see section 7.2)
4. The essence of operation approach (see section 8.2)

Thus, the BIAM contextualisation not only provided a common understanding of the various alignment approaches, but the descriptive analysis also highlighted deficiencies of current alignment approaches. As an example, the BIAM-contextualisation of the *foundation for execution* approach, and more specifically the OM, led to the identification of additional OM deficiencies (see section 7.3).

11.2.1.2 Prospective users of the BIAM

The BIAM is useful to both *academics* and *practitioners*. *Academics* will be able to use the BIAM as a common reference to understand existing alignment approaches (either theoretical alignment approach, commercial-off-the-shelf alignment approaches, or an enterprise-specific alignment approach). The pedagogic value of the BIAM was already demonstrated in using the BIAM to present content on multiple alignment approaches to several audiences. *Practitioners* will also be able to use the BIAM to contextualise the alignment approach currently used at an enterprise. The BIAM contextualisation will present the *practitioner* with a tool to understand the current alignment approach from a business-IT alignment perspective, prior to extending/improving the current alignment approach. Thus, academics and practitioners alike will be able to use the BIAM as a common frame of reference to discuss and understand existing alignment approaches.

In summary, the first scientific contribution of the BIAM, is a model for approach contextualisation. This section provided a summary of the main BIAM components and added a *method-sequence* to enable a practitioner to use the BIAM. Using BIAM-contextualisation of several alignment approaches, according to the *method-sequence* conveyed in this section, additional comparison and enhancement of alignment approaches are possible. The next section presents the second scientific contribution of the BIAM, i.e. the approach comparison abilities of the BIAM.

11.2.2 The Business-IT Alignment Model (BIAM) for approach comparison

The second scientific contribution of the BIAM pertains to the classification categories for approach comparison. Since many enterprises use hybrid alignment approaches (Blowers, 2012), the BIAM facilitates comparison between the approaches and assists with evaluating their compatibility. Compatible alignment approaches could then be used in combination, or elements from one approach may be incorporated within another approach, such as suggested by Mingers & Brocklesby (1997). This section refers to limited generalisation, based on a single case presented in this thesis that demonstrates the use of BIAM. The case refers to the comparison of two alignment approaches (the *foundation for execution* approach and *essence of operation* approach). This section conveys the use of BIAM to compare alignment approaches for compatibility.

The case presented in this thesis, used the descriptive analyses of two alignment approaches to discuss similarities and differences with respect to the four BIAM components (see Table 16 in section 8.3.1). However, the interpretation of the similarities and differences between the approaches are context-sensitive and depends on the intent of the comparison exercise. Since the case presented in this thesis, intended to *enhance* the OM of an existing approach with an element (interaction model) from another approach, *similarities in paradigm* provides a good indication of approach compatibility according to Mingers & Brocklesby (1997). However, the *differences* between the *foundation for execution* approach and *essence of operation* approach may indicate that one approach may complement the other, or more specifically, one approach

may address deficiencies of another. Thus, comparison of alignment approaches for compatibility purposes, can only be generalised in terms of a comparison table.

The comparison table (Table 24) compares two approaches (Approach 1 and Approach 2) to highlight similarities and differences in terms of four comparison categories. The comparison categories (shaded in grey on Table 24) represent the main components of the BIAM, which are:

- Component 1: Alignment belief/paradigm of creating value.
- Component 2: The dimensions for alignment (design domains, concerns & constraints, and enterprise scope).
- Component 3: Alignment mechanisms and practices.
- Component 4: Alignment approach classifiers (version/versions of architecture, starting point for alignment, alignment frequency, changing/dynamic nature of components).

Table 24: Alignment approach comparison grid

Approach 1	Approach 2	Similarities / Differences
Paradigm of creating value		
The dimensions for alignment		
Alignment mechanisms and practices		
Alignment approach classifiers		
(1) Version of architecture		
(2) Starting point for alignment		
(3) Alignment frequency		
(4) Changing/dynamic nature of components		

Based on approach compatibility, it may be feasible to use two approaches in combination. The single case presented in this thesis enhanced the *foundation for execution* approach with an element (interaction model) from the *essence of operation* approach.

In summary, the second scientific contribution of the BIAM is an approach comparison table, derived from the four main components of the BIAM. The approach comparison table is useful when *practitioners* or *academics* need to compare two approaches to assess their compatibility.

The next section elaborates on the contributions that were extracted due to the enhancement of the *foundation for execution* approach and the development of a Process Reuse Identification Framework (PRIF).

11.3 THE PROCESS REUSE IDENTIFICATION FRAMEWORK (PRIF) CONTRIBUTIONS (RESEARCH QUESTION 2)

The PRIF addresses the second research question:

What constructs are required for a process reuse identification framework to enhance the operating model concept, using the business-IT contextualisation model?

The BIAM not only addresses the first research question, but also presents three scientific contributions (see Figure 90):

- Contribution 3: An Alignment Approach Enhancement Method (AAEM), using the BIAM
- Contribution 4: Requirements for enhancing the OM for process reuse identification
- Contribution 5: *A method, mechanisms and practices* to enhance the OM concept

Sections 11.3.1 to 11.3.2 explain the three contributions respectively.

11.3.1 An Alignment Approach Enhancement Method (AAEM), using BIAM

As mentioned in the previous section, the BIAM was instrumental in the process of enhancing the OM (associated with the *foundation for execution* approach) with the interaction model (associated with the *essence of operation* approach), which resulted in the construction of the PRIF. The purpose of this section is to present the method that was used to enhance the OM (in Part C of this thesis), as an Alignment Approach Enhancement Method (AAEM) and therefore a scientific contribution. Although not the initial aim of this thesis, the AAEM is an added contribution resulting from the design research approach that was followed. The section starts with the delineation of the AAEM, followed by the prospective *users* of the AAEM.

11.3.1.1 The Alignment Approach Enhancement Method (AAEM)

The theoretical foundations of the AAEM is the *design cycle* (Vaishnavi & Kuechler, 2004/5) as discussed in section 2.3.2.1, the basic *systems design process* defined by Dietz (2006) and discussed in section 3.2.2, and the BIAM as defined in section 4.3.2.

The AAEM (Figure 92) follows the *design cycle* to enhance an existing approach (Approach 1) with another approach (Approach 2):

1. The design cycle thus starts with the initial *awareness* that Approach 1 needs enhancement due to deficiencies (Figure 92, *Awareness of problem*).
2. The *suggestion* (Figure 92, *Suggestion*) implies that Approach 1 will be enhanced, using elements from another approach.
3. *Development* of enhancements to Approach 1 (Figure 92, *Development*) requires a *basic system design process* (Figure 92, *Basic system design process*):

- The constructional understanding of Approach 1 is a prerequisite for *determining functional requirements for Approach 1 enhancements* (Figure 92, *Determining functional requirements for Approach 1 enhancements* arrow). A BIAM-contextualisation of Approach 1 (Figure 92, *Contextualisation 1*) contributes towards a constructional understanding of Approach 1.
 - Based on the functional requirements, a suitable approach (e.g. Approach 2) is selected to enhance Approach 1 (Figure 92, *Selecting a suitable approach to enhance Approach 1* arrow).
 - A BIAM-contextualisation of Approach 2 (Figure 92, *Contextualisation 2*) is then required to understand the construction of Approach 2 and the construction of its associated elements.
 - The function for Approach 1 enhancements are used to *devise constructional requirements for Approach 1 enhancements* (Figure 92, *Devising constructional requirements for Approach 1 enhancements* arrow).
 - Finally, a creative process is used to incorporate *constructional requirements* and the selected elements from Approach 2 (Figure 92, *Selecting elements from Approach 2* arrow) to construct Approach 1 enhancements (Figure 92, *Construction*).
4. The enhancements are evaluated (Figure 92, *Evaluation*).
 5. The design cycle finally concludes (Figure 92, *Conclusion*).

The *circumscription* arrows (Figure 92, *Circumscription*) allows for additional cycles during the *development* and *evaluation* steps, to accommodate the unique context of the research project and the selected alignment approaches.

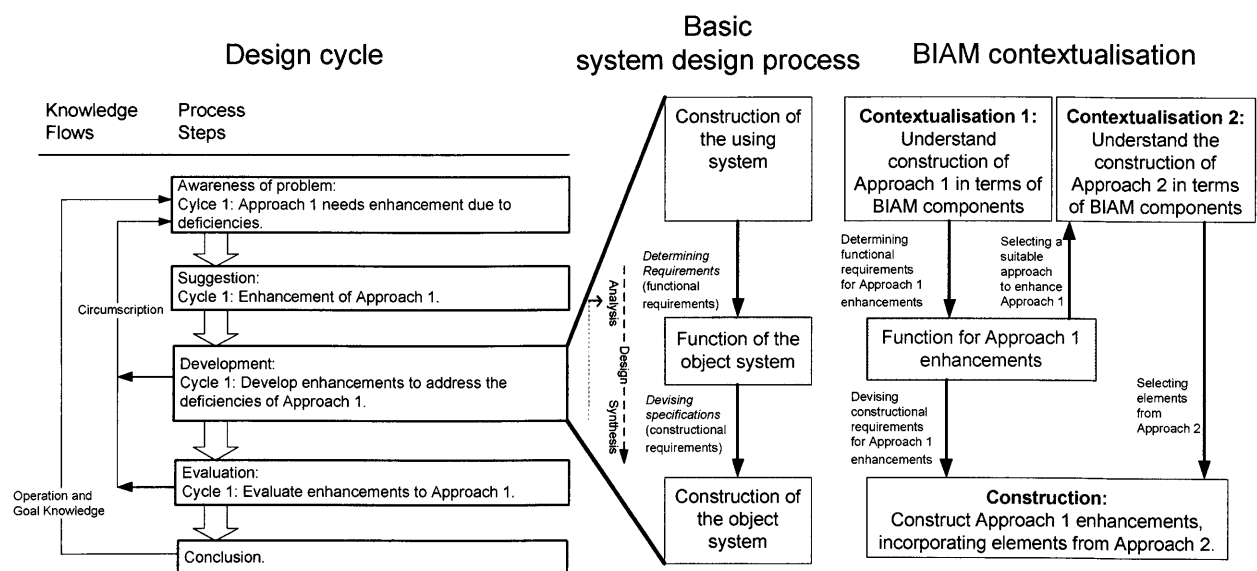


Figure 92: Alignment approach enhancement process

11.3.1.2 Prospective users of the Alignment Approach Enhancement Method (AAEM)

Researchers should use the AAEM to enhance an existing business-IT alignment approach, with the aim of extending the current scientific knowledge base. Once verified, the enhanced business-IT alignment approach may be applied by practitioners.

This study demonstrated a single case of the AAEM to enhance the OM (associated with the *foundation for execution* approach) with the interaction model (associated with the *essence of operation* approach).

In summary, the third scientific contribution from this study is the AAEM, which is useful to researchers when an existing business-IT alignment approach need to be enhanced with another alignment approach.

The next two sections convey the results of the single case when the AAEM is used to develop a Process Reuse Identification Framework (PRIF). The PRIF can be decomposed into two scientific contributions: a set of *requirements* for enhancing the OM for process reuse identification (the fourth scientific contribution), and a *method, mechanisms and practices* to enhance the OM concept (the fifth scientific contribution).

11.3.2 Requirements for enhancing the OM for process reuse identification

The design research approach was instrumental in the development of a PRIF (Process Reuse Identification Framework) to address some of the OM deficiencies. As discussed in the previous section (section 11.3.2), new knowledge (an AAEM) was created due to the iterative nature of the design cycle. The iterative nature of the design cycle ultimately produced two main outputs: (1) a set of *requirements* for enhancing the OM for process reuse identification, and (2) a *method, mechanisms and practices* to enhance the OM concept. This section discusses the first part of PRIF, the set of requirements for enhancing the OM for process reuse identification, as a scientific contribution.

No	Category	Requirement Detail	Motivation
R1	User(s) of the practices and related mechanisms	Any EA practitioner who wants to use the OM specified by Ross et al. (2006) and needs to collaborate with other stakeholders in defining the required level of process standardisation/replication.	The practices and mechanisms are created for the purpose of enhancing the OM concept as defined by Ross et al. (2006).
R2	Generality	The practices and mechanisms should be generic in their application to different types of industries. An EA practitioner should be able to apply the practices and mechanisms to either a profit-driven, not-for-profit/government organisation within any industry, in combination with the foundation for execution approach.	The foundation for execution approach is generic in its application. The generic use may be attributed to the fact that the foundation for execution approach aims at cost reduction due to process rationalisation. Cost reduction is an aim for both profit and not-for-profit organisations. Cost reduction should however not be driven at the expense of needful flexibility.
R3	Process categories excluded	The practices and mechanisms may be applied to all processes in the organisation however, practices and mechanisms will be most effective when applied to the primary activities of an organisation.	The foundation for execution approach is based on the paradigm of creating a foundation for execution, which not only focuses on competitive distinctive capabilities, but also rationalising and digitising everyday processes that a

The requirements for PRIF *method, mechanisms and practices* stated a set of seven requirement categories (see Table 25) to address several OM deficiencies (see sections 6.6 and 7.3).

Table 25: Requirements for addressing deficiencies pertaining to process reuse identification opportunities at enterprises (duplicate of Table 15)

No	Category	Requirement Detail	Motivation
R1	User(s) of the practices and related mechanisms	Any EA practitioner who wants to use the OM specified by Ross <i>et al.</i> (2006) and needs to collaborate with other stakeholders in defining the required level of process standardisation/replication.	The practices and mechanisms are created for the purpose of enhancing the OM concept as defined by Ross <i>et al.</i> (2006).
R2	Generality	The practices and mechanisms should be generic in their application to different types of industries. An EA practitioner should be able to apply the practices and mechanisms to either a profit-driven, not-for-profit/government enterprises within any industry, in combination with the foundation for execution approach.	The foundation for execution approach is generic in its application. The generic use may be attributed to the fact that the foundation for execution approach aims at cost reduction due to process rationalisation. Cost reduction is an aim for both profit and not-for-profit enterprises. Cost reduction should however not be driven at the expense of needful flexibility.
R3	Process categories included	The practices and mechanisms may be applied to all processes in the enterprise however; practices and mechanisms will be most effective when applied to the primary activities of an enterprise.	The foundation for execution approach is based on the paradigm of creating a foundation for execution, which not only focuses on competitive distinctive capabilities, but also rationalising and digitising everyday processes that a company requires to stay in business (Ross <i>et al.</i> , 2006, p. 4). The practices and mechanisms will however be most effective when applied to the primary activities of an enterprise, as support activities automatically provide the opportunity for enterprise-wide standardisation (Smith & Fingar, 2003, p. 63).
R4	Current architecture capabilities	The practices and mechanisms need to take current work in terms of Enterprise Architecture, Business Architecture and Process Architecture into account, but also need to provide sufficient detail if none of these architectures have been defined/documented.	According to Ross <i>et al.</i> (2006, p. 26), the first step in building a foundation for execution is to define the OM for the enterprise. No pre-conditions are defined for defining this model. The ability to define this model however is dependent on current architecture capabilities and documented/explicated architectures. Immature architecture capabilities may require additional architecture work, such as defining enterprise-wide process management standards and a centralised process repository (Smith & Fingar, 2003, p.

No	Category	Requirement Detail	Motivation
			177).
R5	Process representation	<p>The practices and mechanisms should encourage consistent process representation to ensure re-use. The extent of re-use includes the following:</p> <ol style="list-style-type: none"> 1. It should be possible to add process measures if required for the purpose of performance measurement and/or process improvement. 2. The process representations should support end-to-end views of processes. 3. Process representations should not hamper the transition from the third to fourth levels of architecture maturity, i.e. it should allow for modular process design. 4. The representations that are used to communicate process replication opportunities should be understandable to business users (from the contextual and conceptual viewpoints). 	<p>A consistent representation may enhance communication about how the business operates, enable efficient hand-offs across enterprise boundaries and allow for consistent performance measurement across enterprise entities or similar competitors (Davenport, 2005). In addition, transitioning from a third to fourth level of architecture maturity (as defined by Ross <i>et al.</i>, 2006) requires the identification of business services that may be shared among different enterprise entities. Heinrich <i>et al.</i> (2009) maintain that the identification of business services requires a consistent representation of the enterprise's processes.</p>
R6	Replication identification	<p>The mechanisms and practices should enable the identification of operational similar organising entities.</p>	<p>Weill and Ross (2008) mention that replication opportunities may be defined across various types of entities (business units, regions, functions and market segments). The OM itself is however primarily used in defining replication and data sharing requirements across business units.</p>
R7	Feasibility analyses	<p>The mechanisms and practices should not suggest the means for assessing or measuring the feasibility of process replication/rationalisation. Feasibility analysis, e.g. operational, cultural, technical, schedule, economic and legal feasibility (Whitten & Bentley, 2007)) that may be associated with process rationalisation solutions are therefore excluded.</p>	<p>Although a feasibility analysis may direct the required level of process standardisation, this set of mechanisms and practices will merely propose a way of identifying replication opportunities, based on similarities between units.</p> <p>The means for selecting processes that will benefit most from standardisation and the prioritisation of end-to-end processes for standardisation may require a number of mechanisms and practices.</p>

The requirement categories also demarcated the scope of enhancing the OM in terms of *process reuse identification*. In addition to the seven requirement categories, additional *constructional requirements* were also identified (see section 9.2) for OM enhancements:

1. Enhance ease-of-use. The PRIF *method, mechanisms and practices* should enable cognition and thus promote its use.
2. Incorporate the interaction model as a part, as motivated in Chapter 8.
3. Address the *implicit method* defined by the OM characteristics (see section 7.3.1):
 - The enterprise needs to analyse certain business architecture parameters to establish rationalisation opportunities.
 - Rationalisation opportunities could be identified within two main areas: (1) Data (sharing data across enterprise entities), and (2) Process (replicating/re-using processes across enterprise entities). The PRIF *method, mechanisms and practices* focus is on identifying rationalisation opportunities pertaining to the second area, i.e. process reuse.
 - Once rationalisation opportunities have been established an enterprise needs to derive a future OM that would exploit these opportunities.

The scientific contribution of the requirements is that the explicated set of requirements may be used for future expansion of the PRIF *method, mechanisms and practices*. For future research, the existing set of requirements may be expanded to include other requirements, e.g. stipulating requirements to evaluate the identified process reuse opportunities in terms of feasible process rationalisation implementations. Also, according to Bertalanffy (1968), the same set of requirements may be used to construct a different output that may be more effective, i.e. easier to use in promoting cognitive understanding.

This section presented the requirements for enhancing the OM for process reuse identification. Based on the set of requirements, the next section offers the resulting *method, mechanisms and practices* as a fifth scientific contribution.

11.3.3 *Method, mechanisms and practices to enhance the OM concept*

This section delineates the second part of PRIF, the *method, mechanisms and practices* to enhance the OM concept, as a scientific contribution.

As developed from the *requirements* that were identified as a scientific contribution in the previous section, the *method, mechanisms and practices* are primarily useful to EA practitioners. The evaluation results discussed in section 10.4 indicated that EA practitioners will only find the *method, mechanisms and practices* useful if the enterprise of interest has a need to standardise processes, and therefore apply the *method, mechanisms and practices* to identify process reuse opportunities in the enterprise.

Although not a primary contribution of this thesis, it is possible to argue that the inclusion of the interaction model as part of the *method, mechanisms and practices*, is a valuable contribution because it assists with the ontological understanding of enterprise operation. The interaction models that are developed, due to an application of the *method, mechanism and practices*, may be further extended (developed for other business units) and translated into a complete set of ontological aspect models for the enterprise, which defines/documents the essential construction and operation of an enterprise.

11.4 MAIN CONTRIBUTION OF THIS STUDY

The purpose of this section is to summarise the main contribution of this study, which is the *enhancement of the OM concept, facilitated by a business-IT alignment contextualisation model*.

Business-IT alignment has been a top concern for IT managers for almost 30 years (Luftman & Ben-Zvi, 2010) and remains a challenge in both the private and public/non-profit sectors. Numerous approaches have been developed in the past to pre-empt the problems associated with misalignment between business and IT. Every approach has its own alignment intent, scope and means for alignment. Yet, every alignment approach has its own deficiencies, as exemplified in this thesis with the *foundation for execution approach* and associated OM. One way to enhance an existing alignment approach is to use elements from another approach. However, combined use of alignment approaches requires a common *frame of reference* to ensure alignment approach compatibility. Since a common *frame of reference* was not available, this thesis presented the development of a contextualisation model, the Business-IT Alignment Model (BIAM).

One of the main goals of this thesis was to enhance the OM, due to its inherent deficiencies. The BIAM was instrumental in the process of demarcating the scope for enhancement, focusing only on the deficiencies related to the *identification of process reuse opportunities*. Therefore, the main research question of this thesis had to be answered:

What constructs are required for a process reuse identification framework to enhance the operating model concept within the context of business-IT alignment?

The process of enhancing the OM, led to several scientific contributions, as presented in this chapter. The enhancement process, facilitated by the BIAM, led to the development of the main contribution, which is the Process Reuse Identification Framework (PRIF).

The PRIF answered the main research question, by providing the necessary constructs to enhance the operating model concept within the context of business-IT alignment.

11.5 CONCLUSION

This chapter presented five scientific contributions that resulted in answering the two secondary research questions, and thus the main research question of this thesis. In summary, the five contributions are:

- Contribution 1: A model for approach contextualisation
- Contribution 2: Classification categories for approach comparison
- Contribution 3: An Alignment Approach Enhancement Method (AAEM), using the BIAM
- Contribution 4: Requirements for enhancing the OM for process reuse identification
- Contribution 5: *A method, mechanisms and practices* to enhance the OM concept

The main research contribution is the *enhancement of the OM concept*, facilitated by a *business-IT alignment contextualisation model*.

The next chapter provides a conclusion to summarise the thesis.