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Exploring 'People' as the key element in enterprise architecture implementation: A Critical Realist Perspective

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Exploring 'People' as the Key Element in
Enterprise Architecture Implementation:
A Critical Realist Perspective

This thesis is presented for the degree of
Doctor of Philosophy

Edi Triono Nuryatno

**Edith Cowan University
School of Business and Law
2017**

USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

ABSTRACT

TOGAF (2009) describes the purpose of Enterprise Architecture (EA) is to optimise enterprise-wide systems - the often-fragmented legacy of data processes (both manual and automated) - into an integrated environment that is responsive to change and supports the delivery of the business strategy (The Open Group Architecture Framework [TOGAF], 2009). However, for a number of reasons organisations still have difficulties establishing an effective EA (Raadt & Vliet, 2008; Gartner, 2009; and Janssen & Klievink, 2012, among others) and various reports suggest up to two thirds of implementations do not fulfil expectations (Roeleven, 2010). Being organisation wide with a strong governance element EA has significant social implications and social dependence, yet many implementations wrongly treat EA as solely a technical program. This thesis argues that the lack of focus on the ‘people’ element of EA could be the reason why many organisations still struggle with EA implementation. Recognising the importance of people in EA implementation requires acceptance of implementation as a social program, heavily influenced by the structural and cultural systems surrounding the architecture.

In order to address the need for greater recognition of the role of people and the social aspects of EA implementation, this thesis adopts critical realism (CR) and its most recognised methodology, the morphogenetic approach (MA). Realism emphasises ontology and strongly argues that ontology, methodology and epistemology are closely linked – as Fleetwood (2005, p. 197) suggests, **ontology matters**: “The way we think the world is (ontology) influences: what we think can be known about it (epistemology); how we think it can be investigated (methodology and research techniques); the kinds of theories we think can be constructed about it; and the political and policy stances we are prepared to take”. In order to examine the social implications of technology implementation it makes sense to adopt a well-recognized social theory like critical realism.

This social realist approach proposes an analytical separation between structure, culture and agency (people) in order to examine their interactions over time. The MA suggests three important cycles – structural conditioning, social interaction and structural elaboration that provide a platform for examining possible change. Archer also importantly suggests that the emergent properties of collectivities and individuals differ. Such a model has clear value for examining the “people” acceptance of the new impositions and opportunities provided by the EA implementation. It acknowledges the sociocultural consequences of interactions between the structure and the culture to provide particular situational logics that direct, but do not determine the actions of people.

The MA emphasises strongly the role of time in situation examination suggesting that structure and culture predate subsequent actions by involved agents. The thesis describes particular situational logics or mechanisms emanating from the interaction between structural and cultural systems that encourage particular behaviours in response to the EA program. These actions are then further examined in the sequence of MA cycles. Since mechanisms are only effective if people adopt them or not, another important element in this

study is the part played by “reflexivity”. Reflexivity highlights the linkage between people concerns, projects and practices as people act in order to promote their concerns, and form projects to advance or to protect what they care about most. Reflexivity is an important mechanism for explaining how people’s ultimate concerns impact on their approach to the impositions of EA.

An Australian university implementing EA (termed UX for anonymity) has been used as a case study in this research – this fortuitous timing allowed a careful and detailed examination of implementation over a 3-year period from initial rollout to ultimate acceptance. The study describes the challenging environment of university implementation where “academic freedom” is paramount and individual and group autonomies are threatened by EA – the study presents the important mechanisms and situational logics that direct people’s actions within the complex social context of a university. Semi-structured in-depth interviews were used as the primary method of data collection across UX stakeholders. A range of interviews were held throughout the study period with the university IT Governance Committee, the University Architecture Board, the CIO, and the Enterprise Business Group, as well as individual end-users such as teaching staff, researchers, students, and administrative staff of the faculties, schools and service centres. The MA provided a basic structure for unravelling the social complexity and helped guide the interview questions to identify the generative mechanisms hidden in the real domain, and to highlight the conditions that encourage individual and collective acceptance of EA practices. The reflexivity indicator developed by Archer –ICONI– is used throughout to explain how personal projects are formed and how they mediate the exercise of structural/cultural constraints and enablement within EA implementation. Passive participation in regular EA implementation meetings at UX was also important and useful to unearth possible perceived causal possibilities emanating from within the program itself and evident within the social context of implementation.

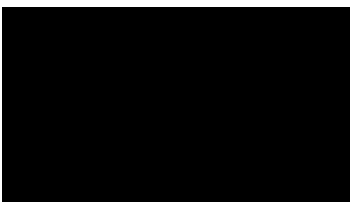
Underpinned by a critical realist perspective, the thesis demonstrates that the MA is a powerful analytical tool to uncover the hidden mechanisms (the situational logics of structures and cultures) and social responses that enable success of EA implementation. The research examines the particular situational logics evident within the University under study and how these provide opportunities and constraints to the acceptance of EA over time. Equally important was reflexivity theory in attaining knowledge and understanding about what it is about people’s internal relations that makes EA implementation succeed.

This thesis offers organisations a means to focus on the deeper issues of EA implementation programs by understanding the social complexity surrounding the architecture. The recognition of people as a key element in EA implementation provides a useful explanation of how the key stakeholders (and their power, influence and interests) may constrain and enable EA implementation. By including reflexivity as an important mechanism, organisations will be in a better position to understand the role of people and their interactions with pre-existing structures and cultures operating over different time periods – reflexivity suggesting that “people” always have the possibility to do otherwise than expected, largely dependent on their personal history and their current personal projects and ultimate concerns.

DECLARATION

I certify that this thesis does not, to the best of my knowledge and belief:

- i. incorporate without acknowledgment any material previously submitted for a degree or diploma in any institution of higher education;
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- iii. contain any defamatory material



.....

Edi Triono Nuryatno

31 January 2017

.....

Date

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Perth, 31 January 2017

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CHAPTER ONE: INTRODUCTION

1.1 Background

The rapid increase in the use of information-related technology has changed the way in which business is done in almost all organisations today. Technology-supported information and communication has impacted organisations in numerous ways, particularly the way we do business. The primary benefit of information and communication within organisations is to keep workers connected. Therefore, to ensure that employees are productive, information and collaboration technologies need to be in place and technology must support collaboration. This has led to the use of Information Systems (IS) and Information Technology (IT) as vital services for organisations who are increasingly looking towards the application of IS and IT to not only underpin existing business operations and extend organisational boundaries, but also to provide a strategic advantage by facilitating problem solving, increasing productivity, quality and speed, improving customer service, and enhancing information, communication and collaboration (Ward & Peppard, 2002; Turban, Leidner, McLean, & Wetherbe, 2008).

From a technical point of view, enterprise architecture (EA) addresses IT demands by providing the framework for technology, essential hardware, software and the telecommunications network. From an IS standpoint, EA describes organisational plans, visions, objectives and problems, and the information required to support organisational IS goals in response to constantly changing needs in the business environment. The purpose of EA is to optimise enterprise-wide systems, the often-fragmented legacy of data processes (both manual and automated), into an integrated environment that is responsive to change and supports the delivery of the business strategy (The Open Group Architecture Framework [TOGAF], 2009). For this reason, many organisations use EA as part of their IT and IS management along with their planning activities, as EA plays an important role in strategic planning, alignment and prioritisation of IT and IS goals with the rest of the organisation (Ross, Weill & Robertson, 2006). Such organisations view the right decisions as those driven or guided by EA, and the right results as the use of EA in ensuring projects improve the bottom line impact of IT and IS (Benson, Bugnitz & Walton, 2004).

Hence, EA can be seen as the strategic context for the evolution of organisational Information Systems in response to ever-changing business environments. This was identified by the JISC^{1.1} (2008) as:

Enterprise Architecture (EA) is about enabling organisations to adapt to change by defining, in a generic way, how their business processes work in tandem with their Information and Communications Technology (ICT) systems. With this clarity of purpose, organisations are able to re-configure or replace their systems with a clear understanding of how these changes might impact on business processes across the organisation.

In describing the various possible interactions of the research components in multiple ways, this study used text boxes to represent the emergent nature of the research process. The aim of text boxes is to eliminate unnecessary confusion of abbreviations, and terminology complexity within the IS-Social domain under study.

Box 1.1: JISC

JISC is a Joint Information Systems Committee in United Kingdom, non-departmental public body whose role is to support post-16 and higher education, and research by providing leadership in the use of information and communications technology in learning, teaching, research and administration (<http://jisc.ac.uk/>)

Nevertheless, it is not simple for organisations to adapt to change triggered by EA programs, since they are not only driven by forces outside the organisation to remain competitive and customer focused, but also by forces inside the organisation, for example, the influence of often unknown relationships between the social structural and cultural dimensions, as well as key individuals and their functions. These social circumstances, which arise from actions dictated by the interests and needs of key individuals, are likely to impact the way EA is implemented. As identified by Lankhorst (2009):

...stakeholders will be influenced by their particular interest in the observed enterprise, i.e., their concerns. Note that stakeholders, as well as their concerns, may be regarded at an aggregated as well as at an individual level. For example, a single business manager conceiving an information system is a stakeholder. The collective business management, however, can also be seen as a stakeholder of the information system. Yet concerns are not the only factors that influence a stakeholder's conception of a domain. Another important factor is the preconceptions a stakeholder may harbour as they are brought forward by his or her social, cultural, educational, and professional background (pp. 55-56).

Over the years, a number of formalised EA frameworks and methodologies have been developed to describe a detailed model of architectural work (JISC, 2008; Lange & Mendling, 2011) that can be used to develop, design and implement an EA program. According to Urbaczewski and Mrdalj (2006, p. 18) an EA framework can describe "the underlying infrastructure, thus providing the groundwork for the hardware, software, and networks to work together", [as EA] "relates organizational mission, goals and objectives to work processes and to the technical or IT infrastructure required to execute them". However, these frameworks and methodologies tend to emphasise the technical aspects of implementation and neglect the critical role of key individuals (Nuryatno & Dobson, 2016). It has been suggested that the lack of focus on people aspects of EA could be the reason why organisations still struggle with implementation.

As Bente, Bombosch and Langade (2012) suggested, EA "...deals with social elements such as collaborative business processes, organisational leadership, political dynamics and work culture..." (p. 36), and thus requires careful examination of the role of people as "the people element brings complex behavioural attributes into the functioning of an enterprise..." (p. 35). Such a perspective is the core of Janssen's (2012) view of the socio-political dimension in his description of EA as "...a means to inform, guide, direct, and constrain the decisions taken by human beings within organizations" (p. 25). This thesis emphasises Bente et al. (2012) and Janssen's (2012) definition of EA.

In order to address the need for greater recognition of the role of people and the social aspects of EA implementation, this thesis adopted critical realism and its most recognised methodology, the morphogenetic approach (Archer, 1995; 1996; 2013a; 2015), as an appropriate tool to research the topic. Critical realism distinguishes between three overlapping ontological domains in the social world: the empirical, the actual, and the real. As explained by Blom and Morén (2011):

The domain of the empirical consists of what we experience, directly or indirectly. This domain is distinct from the domain of the actual where events happen whether we experience them or not, because what happens in the world is not the same as that which is observed. This domain is, in turn, different from the domain of the real, where we also find the mechanisms that can produce events in the world (p. 62).

According to Bhaskar (Searle, 1995, p. 25) critical realism proposes that events or phenomena should not be the core focus of research. Rather the focus should be on:

...the structures and mechanisms that generate phenomena. These objects are neither phenomena (empiricism) nor human constructs imposed upon the phenomena (idealism), but real structures which endure and operate independently of our knowledge, our experience and the conditions which allow us access to them.

Critical realism not only focuses on a specific event observed, it also looks at what the event says about the underlying causal relationships (or social mechanisms) that are enduring and beyond the common experience (the empirical domain) (Mingers, 2004). Underpinned by a critical realist perspective, Archer's morphogenetic approach proposes an analytical separation between structure, culture and people (agency) in order to examine their interactions over time. It acknowledges the sociocultural consequences of interactions between the structure and the culture to provide particular situational logics that direct, but do not determine the actions of people (agents).

Although the morphogenetic approach has been widely accepted as an explanatory framework for IS studies, there are still perceptions that the potential of this approach has

remained largely unrealised. However, a study conducted by Horrocks (2009) on the use of the morphogenetic approach in a longitudinal case study of information systems development and organisational change in British local government, provided significant empirical evidence to address this perception. Horrocks (2009) argued that the morphogenetic approach allowed detailed descriptions of the defining characteristics of structures, cultures and people in his longitudinal case study. The focus of Horrocks' article was not directly related to the technology implemented, but more to the social and political contexts within which the change occurred. As such, the article can provide guidance for an examination of the complexities of enterprise-wide implementation of technical systems.

Equally, Mutch (2010) provided an example of using the morphogenetic approach in his examination of the use of data warehouses by organisations. He suggested:

Three gains are seen to accrue from this approach: greater clarity about the material properties of technology, links to broader structural conditions arising from the conceptualisation of the relationship between agency and structure, and the potential to explore the importance of reflexivity in contemporary organizations, especially in conditions of the widespread use of information and communication technology (p. 507).

Whilst Mutch was looking at a particular data-warehousing technology, his deep analysis of the role of technology designers and the ultimate adopters provides guidance in the analysis of EA, particularly the widespread implications for technology implementation within organisations. Incorporating this perspective into a morphogenetic approach was an essential element in the development of this study.

In the same way Dobson, Jackson and Gengatharen (2013) utilised the morphogenetic approach to examine the adoption of broadband in rural regions. Whilst their study is more focused on the societal implications of technology, the emphasis on situational logics has relevance to this study on EA implementation. As argued by Archer (1995, p. 218) the compatibility or incompatibility of a cultural system with its sociocultural interaction creates a range of possible situational logics which create conditions for social reproduction (morphostasis) or social transformation (morphogenesis). It will be interesting for future EA studies to examine the extent to which situational logics define the mechanisms for change.

The stratified view of agency used by Archer (1995), separately describes *people*^{1,2} as human beings, actors, and agents with particular institutional roles and positions, and provided fertile ground for examining EA implementation.

Box 1.2: People Terminology

According to Archer (1995) people can be seen from different settings, referred to as a stratified model of people: a) as a population with class, status and power; b) as organised groups also referred to as corporate agency at institutional level; c) as individual actors with roles and positions; and d) as collectivities or primary agency with positions, places, functions, rules, duties, and rights. To appreciate the stratified distinction of people, this research study used the different terms above interchangeably. Detailed explanations of each of these terms are provided in Chapter 4.

The importance of people presupposes EA implementation is a social program heavily influenced by the structural and cultural systems surrounding the architecture. It is also heavily impacted by belief structures underlying the program implementation – the theory or built-in mechanisms. Astbury and Leeuw (2010) acknowledged the success and failure of programs requires an understanding of both the underlying theories built into the program, and the context within which it is implemented. EA methodologies and frameworks have particular theories underlying their largely technical focus, and it is important to understand such theories as well as their social contexts, since the latter is just as important as the former in aiding EA implementation, particularly identification of the social (people-focused) mechanisms that constrain or enable it. This thesis argues EA frameworks need to give more consideration to the social aspects of their target audiences.

Astbury and Leeuw (2010) concluded, that only by understanding both the theories underlying programs and the social contexts within which they are implemented, could they determine “...how and why programs work (or fail to work) in different contexts and for different program stakeholders” (p. 364). They described mechanisms as “...underlying

entities, processes, or structures which operate in particular contexts to generate outcomes of interest” (p. 368). These authors viewed mechanisms as sensitive to variations in context, since they may or may not be activated due to contingent conditions or possible countervailing mechanisms in a particular context. Mechanisms play an important role in this thesis and are best described as “triggerable causal powers” (Mason, Easton & Lenney, 2013). Throughout the remainder of this Chapter and Chapter 2, mechanisms will continue to be referred to in a general sense before a more detailed discussion in section 3.3, Chapter 3.

Since mechanisms are only effective if people (agents) adopt them, another important element in this study is the part played by “reflexivity”. Archer (2007, p. 4) described reflexivity as:

...the regular exercise of the mental ability, shared by all normal people, to consider themselves in relation to their (social) contexts and vice versa. Such deliberations are important since they form the basis upon which people determine their future courses of action—always fallibly and always under their own descriptions.

Such a social approach suggests new ways of looking at EA implementation that widens the scope from a merely technical focus to the broader *socio-technical*^{1,3} aspects of implementation, particularly in the IS domain (Carlsson, 2005; 2006).

An Australian university implementing an EA program (termed UX for anonymity) was used as the case study in this research, over a period of 3 years from commencement to completion. The case study describes the challenging environment and illustrates the important mechanisms and situational logics that direct people’s actions within the complex social context of a university. As identified by Gengatharen, Standing and Knight (2009), the higher education sector in Australia, has over the past two decades, been operating in a climate of uncertainty and change. The sector’s move towards corporatisation, marketisation and rationalisation has introduced unique challenges in the form of a complex reality of social interaction between structure, culture and individuals.

Box 1.3: Socio-technical

Detailed explanations have been presented by Eason (2014), which defines socio-technical systems as "...heterogeneous systems, that is they are constituted of components with very different characteristics" (p. 215).

According to Pasmore (1988) and Trist (1981) (as quoted in Carayon 2006, p. 529) socio-technical systems consists of three components: a) social system; b) technical system; and c) environment.

Furthermore (as quoted in Eason, 2013), "...in the social system, composed of people, is completely different from the artifacts that make up the technical system. The social system, for example, unlike the technical system, is made up of sentient 'components' aware of their environment and capable of generating new behaviour patterns in responses to the changes they perceive. And yet both kinds of system component must work closely together if the system is to function well. The interrelations that govern system behaviour extend in several directions: in task interdependencies in the work to be done, between the people who share the work, between the technical components in what might be more or less integrated technical systems and between humans and technology at many different levels. One way of expressing how socio-technical systems work is to say that the work needed to undertake all the tasks needed to complete the collective task is done by two kinds of resources: human resources and technical resources. Human beings are thus components in the work performing system, taking responsibility for particular tasks and turning their energy and skill into performing those tasks" (p. 215).

JISC (2008) also expressed a similar opinion of the higher education sector (HEs):

Universities and colleges [HEs] are increasingly complex socio-technical systems that are hard to change and yet they face enormous pressures to increase operational efficiencies and to adapt to new challenges (p. 1).

It is in this climate that universities encounter strategic and operational challenges caused by environmental factors (Anderson & Backhouse, 2009) such as global trends in HE, new future themes, and the need for efficiencies, all of which require changes in technology capability. Environmental factors in the HE sector have made it necessary for technology to respond quickly to meet the new expectations of students, staff and other stakeholders, while at the same time facing ever-increasing cost pressures. Increased use of new technologies has changed the way business is done in almost all universities; and to add to the complexities,

different people within the university community view the technology and engage with it in different ways.

Technology-supported information systems and communications in universities have various organisational impacts; the impact on business being the most far-reaching. The primary organisational objective of information and communications is to keep stakeholders connected, so to ensure that students, staff and other stakeholders are productive, information and collaboration technologies therefore need to be in place. This has led to the use of IS as a vital service in universities, who increasingly look to the application of IT for not only underpinning existing business operations and extending organisational boundaries, but also for providing a strategic advantage by facilitating problem solving, increasing teaching productivity, the quality and speed of learning, improving customer service and student engagement, and enhancing information and research network collaboration. EA addresses these challenges by providing a holistic view of the planning and development of an organisation's IS (JISC, 2008; JISC, 2009a; JISC, 2009b; Anderson & Backhouse, 2009; JISC, 2010).

This thesis deeply examined the important mechanisms, critical situational logics and their social responses, the importance of reflexivity in the adoption process, and the EA program mechanisms or theories that drive such large-scale architectural transformation in the university sector. The case study provided an understanding of the contextual factors and a unique opportunity for proposing amendments to existing frameworks to more clearly reflect the critical role of people in the change process.

1.2 The Gap in Enterprise Architecture Research

Despite a considerable number of studies in the area of EA (particularly in the IS domain), most have tended to emphasise the technical aspects of the program and neglected the social aspects. For example, a number of researchers viewed EA in terms of framework comparisons (Leist & Zellner, 2006; Urbaczewski & Mrdalj, 2006; McCharty, 2006; Zarvi'ci & Wieringa, 2006; Scheckkerman, 2007; Sessions, 2007), while others attempted to provide technical guidance (Janssen & Madsen, 2007; Wegmann, Kotsalainen, Matthey, Regev, and

Giannattasio, 2008; Franke, Hook, Konig, Lagerstrom, Narman, Ulberg, Gustafsson, Ekstedt, 2009). Bass and Marbry (2004) focused on technical service-oriented architecture (SOA).

EA implementation with regard to the human domain (the role of people) has been mentioned by several academics (Boh, Yellin, Dill & Herbsleb, 2003; Raadt, Schouten & Vliet, 2008; Raadt & Vliet, 2008; Martin, Purao & Robertson, 2009; Sembiring, Nuryatno & Gondokaryono, 2011; Janssen, 2012; Lohe & Legner, 2013 among them), and by Gartner (2009) and Gravesen (2012) from a practice standpoint, but none of these studies provide any insights into EA as an organisation-wide program with strong social impacts. From a socio-technical point of view there are still many unanswered questions.

Previous EA research from a critical realist perspective demonstrated the use of a morphogenetic approach to explain EA evolution “as an interaction between the existing structural setting (existing EA) and the action of introducing new business or IT capability into an organisation [service-oriented architecture: SOA], which results in EA evolution outcomes (SOA’s integration into EA outcomes)” (Alwadain, 2014, p. vi). Whilst Alwadain’s study is more focused on the relationship between agency (agency seen as an ‘action’: Alwadain, 2014, p. 116) and structure to understand the nature of change, the emphasis on action and structure has a different central point with this thesis, which has an emphasis on the interplay between structure, culture and agency (agency seen as people, as demonstrated by Archer), of which these are the fundamental components of the critical realist approach (Archer, 1995; 1996; 2013a; 2015). As Archer (1995, p. 195) suggested people are capable of resisting, repudiating, suspending or circumventing not only the structural tendency, but also the cultural tendency in unpredictable ways because of their creative powers as human beings in producing tendencies towards change/elaboration (or reproduction) in the relational organisation of the social order. These processes of change (or reproduction) are known as generative mechanisms (Archer, 2015). Such a perspective is the core of Martin’s et al. (2009) view of people role in EA evolution, they expressed the opinion that “Enterprise architecture, its representation, and its uses all evolve; but they evolve in different phases and for different reasons. Difficulty and sometimes even disaster ensue when these evolutions are misaligned. Controlling these evolutions requires understanding the motivations and the mechanisms for evolution (p. 1)”. They also pointed out that “architecture means different things to different people (p. 2)” and “EA artifacts evolve through human-mediated transformations (p. 7)”.

In an enterprise-wide view of social context, people make up a key element in directing the transformation of enterprises with technology. This enterprise-wide view is critical for identifying the social phenomena in individuals' desires, beliefs and actions within their social and cultural environments. Using the philosophical lens and morphogenetic approach (MA) of critical realism (CR) as a framework for studying the social phenomena provided a means of representing how people (as individual and collective agents) reacted to the new impositions and opportunities of EA implementation, both in terms of increased governance and the potential impact on the way they were doing things.

As demonstrated by Archer (1995; 2015), people (agency) offer a stratified representation of their role in organisational change as they can be seen to act as: a) primary agents in particular positions who can generate important social consequences; b) corporate agents in institutions who can organise themselves in pursuit of certain goals and articulate the changes they seek; and c) individual actors in particular roles who acknowledge their vested interests and weigh these interests against one another. In the same fashion, de Vaujany (2008) argued people can be seen to act as: a) an individual/person with a personal and embedded history; b) agents with cultural, economic and demographic features; and c) actors related to a social group with specific interest and strategies. It is important to consider the social complexity of the role of people in EA programs who are shaped by the interplay between contexts and concerns.

This thesis argues, as a planning process with strong social impacts on an organisation's environment, the way in which EA is implemented will strongly impact and be impacted by stakeholders' acceptance of the program, as their actions ultimately enable or constrain adoption. For the most part, the existing literature describes EA as a process of converting strategy statements into plans to support organisational information systems and applications, technology platforms, infrastructure, business processes and services. However, the social nature of the process requires recognition of EA as a social program heavily influenced by the interplay between structure, culture, and agency surrounding the architecture and the mechanisms built into the program. CR will provide the "underlabourer" for the study and the MA will provide the methodological grounding.

The MA emphasises strongly the role of time in situation examination suggesting that structure and culture predate subsequent actions by involved agents. The goal of this study

was therefore to describe particular situational logics or mechanisms emanating from pre-existing interaction between structural and cultural systems – it is suggested that these situational logics encourage particular behaviours in response to the EA program. Since mechanisms are only effective if people adopt them or not, another important element in this study is the part played by “reflexivity”. Reflexivity highlights the linkage between people concerns, projects and practices as people act in order to promote their concerns, and form projects to advance or to protect what they care about most (Garcia-Ruiz & Rodriguez-Lluesma, 2010). Reflexivity will also play an important role in the thesis as it is an important mechanism for explaining how people’s projects and ultimate concerns impact on their approach to the impositions of EA.

1.3 Significance of the Research

As an independent design discipline somewhere between business strategy and architecture (Gravesen, 2012) EA has been widely adopted over the past 20 years in the commercial world and public sector organisations as a tool for change (Anderson & Backhouse, 2009). There is no doubt that EA benefits are real (Gravesen, 2012; Janssen, 2012), however, it appears that EA has generally not achieved the desired results (Boh et al., 2003; Raadt & Vliet, 2008; Gartner, 2009; Gaver, 2010; Roeleven, 2010; Gravesen, 2012; Čyras & Riedl, 2012; Janssen & Klievink, 2012).

For a number of reasons organisations still have difficulty establishing an EA that is fully integrated into their IT and IS management. Watkins (1998), for example, argues the lack of a clear understanding of the distinction between the terms IT and IS has led to organisations focusing on IT goals, without consideration for the purpose of IS, and this is one of the reasons why EA has not achieved the desired results. IT refers specifically to technology, essentially hardware, software and telecommunications networks, which in a narrow definition becomes the technology component of IS. The UK Academy of Information Systems (UKAIS) (cited in Ward & Peppard, 2003, p. 3) defined IS “as the means by which people and organisations, utilising technology, gather, process, store, use and disseminate information”. UKAIS defined IS studies as theories and practices related to the social and technological phenomena which determine the development, use and effects of information systems on organisations and

society (Mingers, 1995). EA must recognize both aspects in its planning and management – IT and IS.

TOGAF^{1.4} (2011, p. 52) describes some of the “people” roles in an EA managerial environment thus:

There are many reasons to constrain (or restrict) the scope of the architecture activity to be undertaken, most of which relate to limits in: the organisational authority of the team producing the architecture, the objective and stakeholders concerns to be addressed within the architecture

...

Box 1.4: TOGAF

TOGAF is a detailed method and set of supporting tools for developing enterprise architecture (TOGAF, 2011). It is the most widely used EA framework (judged by published certification numbers) and can be used freely by any organisation wishing to develop and implement EA. A detailed explanation is provided in Chapter 2.

This means the board and management within the organisation, both in business and IT, must collaborate, interact and work together, so that EA becomes embedded in the organisation’s management agenda. Raadt et al. (2008) viewed collaboration between architects and stakeholders of IT as one of the key critical success factors for EA. According to TOGAF (2011, p. 374) EA stakeholders are “...people who have key roles in, or concern about the system; for example, as user, developers, or managers”. From a wider perspective, Bente et al. (2012, p. 32) argued that EA stakeholders are “...the people who deal with creation, evolution, and operation of the system”. In other words they include owners, strategists, planners, designers, subcontractors who provide constituent parts for it, and support staff who maintain and operate the system. According to this viewpoint people play a critical role in implementation.

Evidence suggests that EA implementation is not a single activity with a clear beginning and end (Janssen, 2012), but influenced on an ongoing basis by users' interpretations and extensions, providing feedback for improvement and review (see Figure 4.3). It stands to reason that EA will only be accepted if its implementation is aligned with people's current projects and interests, and people's perceptions will determine how they respond to the new environment provided by the EA. For these reasons EA implementation can be viewed not only as a process for creating a technical IT architecture, but also as a social program.

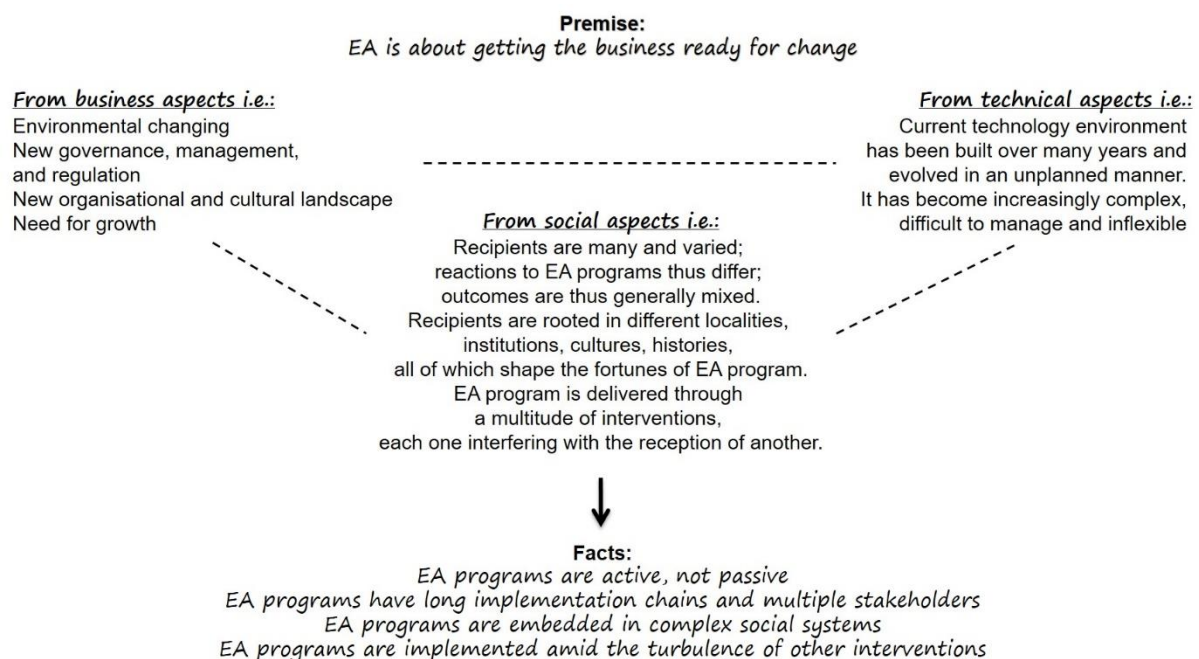


Figure 4.13: Picturing EA from the dynamic of social complex program surrounding the architecture (reproduced here for ease of reference)

In their interpretation of the organisation's attitude towards change through enterprise architecture, Bente et al. (2012) suggested:

...for whatever reason, people start behaving differently and things are changing—not necessarily in the way you envisioned, and not always for the better. What we see here is a classical misconception by people with an analytical mindset. You would assume that a decision-making process works in the sequence Analyze, Think, Change. You provide a thorough analysis, the management thinks about it, and change is triggered. Indeed, this is the kind of rational reasoning incorporated in numerous engineering disciplines and process frameworks. The catch is, as Kotter and Cohen (2002) point out,

things do not work exactly that way. Change processes follow the pattern See, Feel, Change. The issue needs to raise people's attention (see). If they develop a sense of urgency and importance about the topic (feel), they are likely to trigger action (change) (p. 286).

Consistent with these arguments, the JISC's Enterprise Architecture Group Pilot Projects in the HE sector (JISC, 2009a; 2009b; 2010) indicated that implementation of EA is often more social in nature than having a purely technical focus. The goals and scope of EA generally support a more social approach, with all its associated implications in regard to structure, culture, agents and its causal mechanisms. It is in this context that EA implementation has been examined in this thesis, since EA is not merely a technology, but has wide social implications for implementation in organisations.

The adoption of CR, which focused on the implementation of EA at a university over a 3-year period from start-up to conclusion, has significant implications for the objects to be investigated. It provides an important link between realist ontology and practical social-information systems outcomes, and forms a consistent foundation for ontology and methodology by representing the deep and foundational role of people in explaining change. Previous IS research has demonstrated that CR is suitable for studying IS in overcoming some of the difficulties associated with the social contexts (Carlsson, 2006; Horrocks, 2009; Bygstad, 2010; Dobson et al., 2011; Carlsson, 2011; Dobson et al., 2013; Mingers, Mutch, & Willcocks, 2013; Nuryatno & Dobson, 2016, among others).

According to Fox (2009) CR can increase understanding of causal mechanisms and contexts in IS research. Furthermore, the value and importance of CR as a philosophy in IS research was also supported by Pettersen, McDonald and Engen (2009), who acknowledged that CR can address social ontology as a necessary precursor to developing models and empirical accounts of socio-technical systems. Carlsson (2011) expressed the opinion that CR can be useful as an underpinning philosophy for behavioural IS research as well for IS design science research. The use of case study is also well suited to CR-based attempts to find explicit causal explanations for the complex social and organisational phenomena in the IS field (Wynn & Williams, 2008). In addition, Bygstad and Munkvold (2011) indicated CR has an important role

in IS research in identifying causal structures of an ontological depth that is difficult to unveil through other alternative approaches (i.e. positivist and interpretivist).

The university case study provided a unique environment for investigating the role played by people in managing the implementation, as well as the critical role of end-users. In this way this research potentially provides a useful explanation on how to examine the social complexity of enterprise-wide implementation of technical architectural systems.

1.4 Research Questions

The research questions describe how the research mainly seeks to identify important mechanisms that might constrain and enable the success of EA implementation. To appreciate the explanatory context of the study the research questions mainly built upon Archer's morphogenetic approach, supported by Archer's reflexivity theory: a) macro-micro context (identifies the situational mechanisms of the cultural and structural systems that pre-exist people's action); b) micro-micro (identifies the mechanisms of action and interaction between structure, culture and agency); and c) micro-macro (identifies the transformation mechanisms that constrain and enable people's actions to adopt the EA program or not).

The main research question that this research sought to address was: "What are the key implementation mechanisms and social responses triggered by EA implementation that might constrain and enable the success of the EA program in University X and the sector in general?" It was supported by four sub-research questions as follows:

1. What are the important situational mechanisms, that by associated social structure and culture, causally condition individuals' actions?
2. What are the consequent interaction mechanisms triggered by EA implementation at University X?
3. How does the existing culture and structure within University X impact the EA implementation and shape the interaction mechanisms triggered by the implementation?
4. What are the necessary conditions to encourage individual and collective acceptance of EA practices?

Adopting a multi-dimensional cycle of change in the MA, the research questions explore and elaborate on the role of people in EA implementation in terms of structural, cultural and agential change – leading to either morphostatic (reproduction: constraining the success of the EA program) or morphogenetic (transformation/elaboration: enabling the success of the EA program). A detailed explanation of each of the research questions will be presented in section 4.6, 5.3 and 7.2.

1.5 Main Contributions of the Thesis

This thesis explores and builds a theoretical explanation of the role of people as the key element in EA implementation, most notably within the university sector, where, it can be argued, particularly complex social dynamics surround the architecture. To examine the adoption of EA semi-structured in-depth interviews were held with members of the university IT Governance Committee, members of the Architecture Review Board, the CIO, and members of the Enterprise Business Group, as well as the end-users, such as teaching staff, researchers, fellow students, and administrative staff of the faculties, schools and service centres. The interview questions were developed based on a morphogenetic approach to propose the generative mechanisms hidden in the real domain, and to highlight conditions that encouraged individual and collective acceptance of EA practices. The reflexivity indicator developed by Archer – ICONI – was completed by Interviewees and used throughout to determine the likely reflexivity mode evident. Understanding reflexivity modes helps to explain the role of personal projects and how ultimate concerns mediate the structural/cultural constraints and enablements evident during EA implementation. Attendance at regular EA implementation meetings at UX was also important in understanding and explaining the major elements within the program.

Theoretical explanations are given for how initial opposition to the EA program was managed by the university executive and lead to ultimate acceptance over a 3-year period of EA implementation in UX. In particular, this thesis brings together two specific areas of study, EA and social systems, and provides a deeper explanation of EA implementation programs by understanding the social complexity surrounding the architecture. Recognition of people as the key element in EA implementation provides a useful explanation of how the key stakeholders (and their power, influence and interests) may constrain and enable EA

implementation. This thesis also highlights the linkage between people's projects, priorities and ultimate concerns shape their reaction to EA program, as people act in order to promote their concerns, and form projects to advance or to protect what they care about most.

Several theoretical contributions can be advanced as follows:

1. This thesis highlights the usefulness of the morphogenetic approach to identify the hidden mechanisms and situational logics that drive acceptance of EA. This study makes an important link between a realist ontology and practical social-IS outcomes, thus establishing a fundamental consistency between ontology, methodology and practical theory (see Chapter 5 & 6).
2. This thesis identified gaps in EA research and highlights important program mechanisms or theories identified in a review of IS literature (see Table 2.6), and describe how these mechanisms built in to the program acted within situational logics to ultimately support the implementation (see Chapter 6). Some of the mechanisms built in to the EA program included:
 - University EA Road Show: Individuals' Engagement, Shared Vision, and Linkage
 - University New IT Governance, management and regulation: EA Governance
 - University Enterprise Business Group (EBG): Collaboration, Communication, Stakeholders' Role, and Compliance
 - Distributed Leadership (by CIO): Leadership

These mechanisms reside in the program itself and were impacted by the social context. These program mechanisms are shown to be important within the identified opportunism situational logic that also acted as a transformation mechanism (generative mechanism). By corporate agents presenting EA as a platform to promote their own opportunistic projects acceptance was encouraged.

3. This thesis identified the importance of situational logics in explaining social reactions to change programs. It identifies and describes the impact of opportunism as a situational logic in the university sector and how it leads to increasing sectionalism and diversification. The thesis describes the importance of EA recognising this increased sectionalism and diversification.

4. This thesis identifies important generative mechanisms that constrain and enable success of EA programs within the university (see Table 4.3 and Figure 6.6). This identification is important – whilst the mechanisms within the social context are difficult to change, being a consequence of the long-term interaction between culture and structure, their recognition provides an important first step in being able to address their impact. A core argument within social realism is that the first step in addressing inequitable structures is recognition. In order to address inequities, one must be able to recognise their origins and features. This argument can be similarly made for examining the cultural and structural conditions necessary for successful EA.
5. This thesis identified two key implementation mechanisms for encouraging successful EA adoption. Collaboration and Communication are necessary key implementation mechanisms required to accommodate the opportunism situational logic. It is the condition under which EA operates and EA must be in line with it for EA to be successful.
6. This thesis advances the application of reflexivity theory to people's responses to the embedded mechanisms that encourage individual and collective acceptance of EA practices by: a) Identifying how the different reflexivity modes reacted to the inbuilt mechanisms, and; b) Identifying the important collective reflexivity modes. The research findings also show that the reflexivity investigation tool, the ICONI, can successfully be used to better identify the conditions necessary for encouraging individual and collective acceptance of EA practices. The thesis thus provides a unique theoretical contribution to IS theory by advancing our understanding of the role of people's internal conversations (reflexivity theory) in enterprise-wide IT change; it describes how people's projects, priorities and ultimate concerns shape their reaction to EA (see Table 5.2, 6.2 & 6.3).
7. This thesis advances the application of abduction or theoretical redescription in identifying events and non-events within the actual domain (not directly observable), which can be applied to other IS research from a CR perspective. Creative abduction was used as the frame of interpretation; and by focusing on abduction in two domains (the empirical and the real) this study provides fresh insights (see Figure 5.11 & Table 6.5).

From a practical point of view this study makes the following contributions:

1. The thesis provides an example of the application of CR as underlabourer examining the social aspects of EA implementation and management.
2. The thesis provides a detailed example of the application of MA as a useful tool for examining large scale enterprise wide change.
3. The thesis applies Archer's newly developed reflexivity theory to understand and explain how people reflexively react to large scale IT based change programs.
4. The application of MA and reflexivity in combination provide a powerful explanatory framework for examining the critical role of people in the change process.
5. The long term 4-year case study followed the implementation from initial start-up to ultimate acceptance – this unique opportunity has particular benefits for other universities as the importance of EA is increasingly becoming recognised in the sector. The study allows a detailed understanding of the contextual factors and implementation issues related to such large-scale transformation (see Chapter 6 & 7).

1.6 Thesis Outline

The first chapter of the thesis provides a brief description of enterprise architecture as an independent design discipline and as a model-based management and planning approach. In addition, the social contexts of higher education information systems are discussed. Chapter one also includes a review of current influences, previous studies on the topic, the gap in enterprise architecture research, the significance and main contributions of the thesis.

The next chapter provides an analysis of existing literature related to the importance of people in enterprise architecture implementation from the perspective of a social program heavily influenced by the structural and cultural systems surrounding the architecture and the mechanisms built into the program. Program mechanisms, specifically the success mechanisms identified in the literature, are reviewed and summarised.

Chapter three examines the various versions of social realist theories; their underlying focus on ontology and the methodological and theoretical implications of their underlying premise. The chapter provides a deep understanding of the implications of particular philosophical positions and allows an understanding as to the benefit that critical realism can provide. The

chapter can only provide a limited comparison but emphasises the underlying argument of this thesis that philosophy matters (Dobson, 2001a).

Chapter four discusses the key concepts of critical realism. It presents a literature review associated with a critical realist perspective of information systems research and a morphogenetic approach as an explanatory framework, and describes the central role of reflexivity theory in EA implementation. An analysis of the morphogenetic literature provides the grounding for a causal explanation for the study as an exploration of the interplay between structure, culture and agency. On the basis of the MA and critical realism the research questions are defined.

Chapter five outlines the research approach and methodology, including the underlying philosophy and its methodological framework, the context of the research questions, the research design and its limitations, as well as the ethical considerations of the research. This chapter explains the rationale for using critical realism as the underlying philosophy for a social investigation in the IS domain, and for using a single university case example. The use of a critical realist perspective for the methodology of the study is also discussed to provide an overview of the target population, materials, the data collection procedures and the morphogenetic approach as the main analytical tool.

The case study, data analysis and research findings are presented in Chapter six which describes the analysis by means of a critical realist view of the causal factors and mechanisms. It presents the patterns of results from each of the critical realist domains to reveal a range of important generative mechanisms, critical situational logics, analytical histories, key implementation mechanisms, and social responses.

The findings for each research question are discussed in Chapter seven in relation to information systems theory and the wider body of knowledge. The implications of using a critical realist philosophy to gain further understanding of the research problems are explored, along with implications for practice. The limitations of the research, along with future research directions, are also discussed. The final chapter contains the concluding remarks. The structure of the thesis is illustrated in Figure 1.1 below.

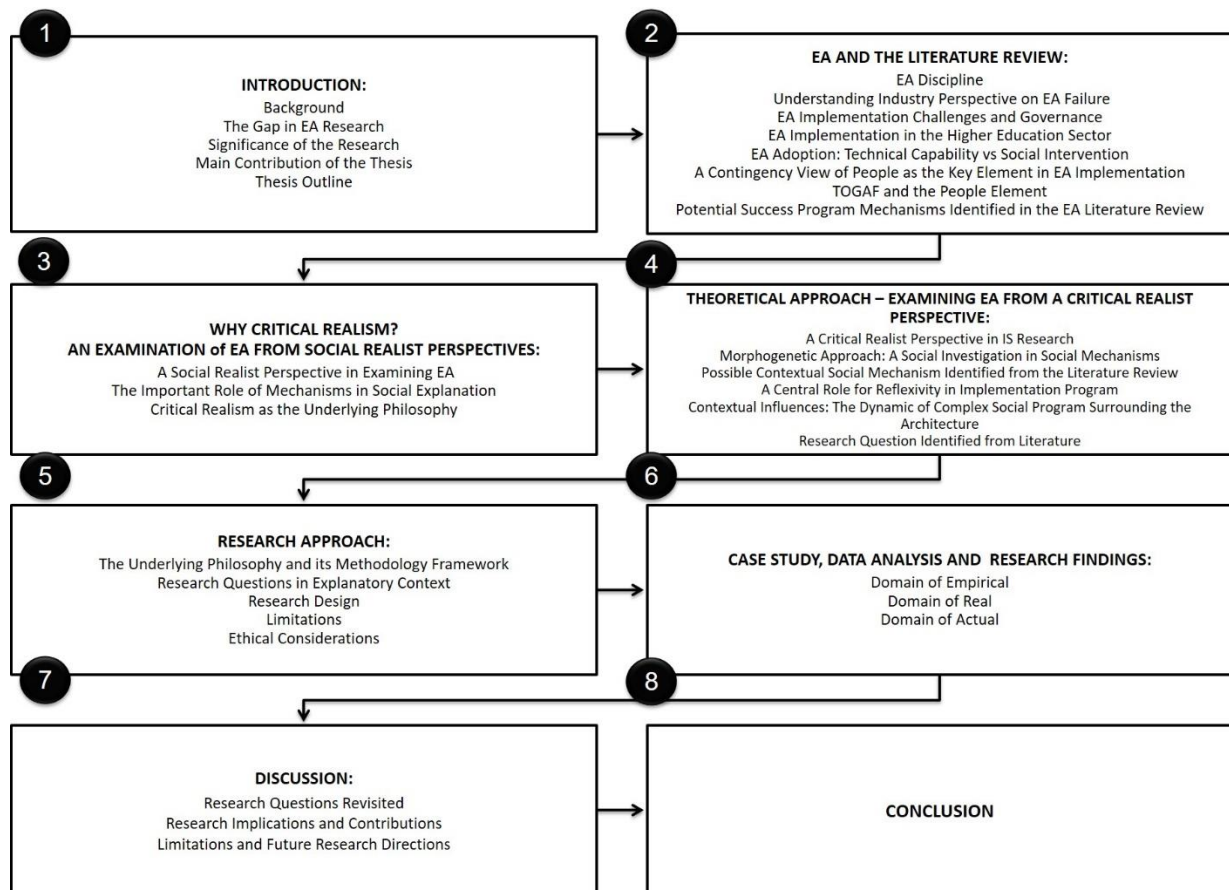


Figure 1.1: Thesis structure

1.7 Summary

This thesis was prompted by the observation that some organisations appear to succeed with EA implementation and others don't. It proposes that a lack of recognition of the role of people may provide an explanation for this anomaly, and uses critical realism to gain an understanding of the complex social dynamics amongst EA stakeholders and their key issues and concerns related to the EA implementation.

The importance of people in EA implementation presupposes acceptance of EA implementation as a social program, heavily influenced by inherent structural and cultural systems and mechanisms built into the program. Together with the structure and levels of rigour and formality within the organisation, these factors influence implementation by preventing or supporting change and effective operation.

CHAPTER TWO: ENTERPRISE ARCHITECTURE AND THE LITERATURE REVIEW

2.1 Overview

For many years enterprise architecture (EA) programs have encapsulated a long-term perspective of companies' business processes, information systems and technologies (Ross et al., 2006). EA is widely regarded as the starting point for a process of change because it shows up the gaps between the current situation and the ideal situation, and facilitates alignment between organisational information systems (IS) and business goals (Anderson & Backhouse, 2009). However, the implications of EA programs and their implementation are still varied and complex (Boh et al., 2003; Raadt et al., 2008; Gartner, 2009; Roeleven, 2010; Gravesen, 2012; Janssen, 2012; Janssen & Klievink, 2012; Lohe & Legner, 2013). To date research has focused predominantly on the IT capability of organisations and the technical aspects of implementation and has neglected the role of people (Nuryatno & Dobson, 2016). Benson et al., (2004) pointed out that many companies describe EA programs in "as-is" and "to-be" technical contexts. For instance, the "as-is" context focuses more on technology issues, less on business processes, and even less on the social context; whereas the "to-be" context focuses predominantly on the technology to be implemented. On the one hand, these programs are primarily built on a resource-based view of *EA methodologies and frameworks*^{2.1} that have particular social theories underlying their largely technical focus; yet on the other hand, implementation of EA programs is often driven by technical aspects of IT, regardless of the complex social contexts in which they exist (Bente et al., 2012; Janssen, 2012).

The social context of EA is just as important as the technical context in facilitating the implementation of EA programs, particularly identification of the social (people-focused) mechanisms that constrain or enable them. A social perspective is necessary to allow for such examination. A review of the academic literature and so-called grey literature revealed a focus on the TOGAF framework, the most referenced EA implementation framework in the higher education sector (Anderson & Backhouse 2009; JISC, 2009b). Coupled with evidence

of gaps in the existing body of knowledge, the research questions in Chapter 4 were formulated.

Box 2.1: EA Methodology and Framework

EA methodology is “...a defined, repeatable series of steps to address a particular type of problem, which typically centres on a defined process, but may also include definition of content.” (TOGAF, 2011, p. 7)

EA framework is “...a foundational structure, or set of structures, which can be used for developing a broad range of different architectures. It should describe a method for designing a target state of the enterprise in terms of a set of building blocks, and for showing how the building blocks fit together. It should contain a set of tools and provide a common vocabulary. It should also include a list of recommended standards and compliant products that can be used to implement the building blocks.” (TOGAF, 2011, p. 27)

The first section of this chapter examines the extent to which the role of people has been identified in existing EA research and EA frameworks. Since the importance of people is also impacted by the theory or mechanisms built into the program (Astbury & Leeuw, 2010), it is important to understand such theories in order to identify program mechanisms and issues that influence the success and failure of EA implementation. Program mechanisms, specifically the success mechanisms identified in the literature, are reviewed and summarised.

Next, the chapter provides an analysis of the existing literature related to an industry perspective on EA failure. The challenges of EA implementation and governance are summarised, and the literature on EA implementation in higher education is discussed in more detail to illustrate the naturally conservative nature of universities impacting the implementation program. The processes operating at social, structural and cultural levels are also examined, followed by a summary of the most significant challenges and program mechanisms that facilitate EA implementation in the higher education sector. Social context versus technical capability is discussed from the viewpoint of people as a key element in EA

implementation. Finally, the use of programs with embedded social and cultural norms, aligned to central themes in the TOGAF literature, are recommended to integrate the important role of people and relationships, program mechanisms and guidance in the form of a TOGAF-based implementation framework for the higher education sector.

2.2 Enterprise Architecture Discipline

EA has been used in industry for over twenty years (Gravesen, 2012) as an independent design discipline that combines strategy and architecture. Today there is little doubt that the benefits of EA are real (Janssen, 2012). Spragg (2015) expressed the opinion that EA is about preparing a business for change, and the flexibility and agility of EA programs are therefore becoming strategic necessities (Doucet, Gøtze, Saha, & Bernard, 2008) as they enable transformation. Ross et al. (2006) concluded “greater globalization, increasing regulation, and faster cycle times all demand an ability to quickly change organizational processes” (p. 12). According to these authors the *IT engagement model*^{2.2} allows organisations to achieve the right balance between IT efficiency and business innovation.

Box 2.2: IT Engagement Model

The IT engagement model “...is the system of governance mechanisms that ensure business and IT projects achieve both local and companywide objectives. The IT engagement model influences project decisions so that individual solutions are guided by the enterprise architecture. The engagement model provides for alignment between the IT and business objectives of projects, and coordinates the IT and business process decisions made at multiple organizational levels (e.g., companywide, business unit, project). To do so, the model establishes linkages between senior-level IT decisions, such as project prioritization and companywide process design, and project-level implementation decisions.” (Ross et al., 2006, p. 9)

Despite its wide adoption as a strategic management technique for aligning business with IS (Ross et al., 2006) and adapting to change (Anderson & Backhouse 2009), EA implementation

appears not to have achieved the desired results. This is referred to in the literature as EA phenomena (Boh et al., 2003; Raadt & Vliet, 2008; Gartner, 2009; Gaver, 2010; Roeleven, 2010; Gravesen, 2012; Janssen & Klievink, 2012; Čyras & Riedl, 2012). Research related to an industry perspective on EA failure (representing 161 respondents from 89 organisations across a wide range of industries) stated that 66% of EA programs did not fulfil organisations' expectations (Roeleven, 2010, pp. 2-3). For a number of reasons organisations still have difficulties establishing an EA that is fully integrated with their IS management. More recent research has identified people, as individuals or social groups (Bente et al., 2012; Janssen, 2012; Nuryatno & Dobson, 2016), as a key factor in EA implementation and a major cause of the failure of EA programs to meet organisations' expectations (Boh et al., 2003; Raadt et al., 2008; Gravesen, 2012; Janssen, 2012; Janssen & Klievink, 2012; Lohe & Legner, 2013). A comprehensive review of the EA framework, such as TOGAF's (2011) key ideas about people-focused mechanisms, highlighted:

Typically, an enterprise architecture is developed because key people have concerns that need to be addressed by the IT systems within the organization. Such people are commonly referred to as the "stakeholders" in the system. The role of the architect is to address these concerns, by identifying and refining the requirements that the stakeholders have, developing views of the architecture that show how the concerns and the requirements are going to be addressed, and by showing the trade-offs that are going to be made in reconciling the potentially conflicting concerns of different stakeholders (p. 7).

Another interesting EA framework that can be used to highlight the people element is the Zachman framework (Zachman, 1987). As the oldest and best-known of the EA frameworks, Zachman prescribes people as "who is doing what" (Zachman, 1987, p. 292). Zachman's people element or so-called the "people dimension" (the "WHO" column, see Zachman, 2008), is focused on identifying people participation in the organisational activities. According to Ertaul and Rathod (2012), the "WHO" column defined the roles, privileges and responsibilities attached to each person within the business management perspective. However, they also highlighted:

Although the Zachman Framework provides a perfect tool for classification of artifacts and delegation of responsibilities, it fails to provide any step-by-step process for building the reference model and Enterprise Architecture. [Thus] Enterprises in general have become global now. This led to rapid dynamic changes in organization. The Zachman Framework lacks the agility to handle these rapid changes. (p. 5).

Whilst the Ertaul and Rathod (2012) study is more focused on the Owner's perspective of the Zachman Framework and its security requirements, the suggestion that a framework must recognise of the ever-increasing size and complexities of EA is important. Janssen and Madsen (2007) indicated that "...the Zachman framework is too complex to support communication.... it is too abstract to capture our architectural problems (p.6)". While the framework is widely discussed and is a foundational contribution to enterprise architecture, its practical value has been questioned (Ylimäki and Halttunen, 2006; Janssen & Madsen, 2007; Scherer & Wimmer, 2011; Ertaul & Rathod, 2012). The framework does however specifically highlight the "people" dimension and places it equally alongside the other important dimensions. The framework is an important foundational framework that supports the basic suggestion that a recognition of the "people" role is essential for a complete description of EA.

Amongst numerous goals (e.g. Benson et al., 2004; Ross et al., 2006; Urbaczewski & Mrdalj, 2006; Zarvic & Wieringa, 2006), EA can be understood as a means "...to optimise across the enterprise-wide systems the often fragmented legacy of data processes (both manual and automated) into an integrated environment that is responsive to change and supportive of the delivery of the business strategy (TOGAF, 2011)" or as "...a guide for an enterprise's business processes and the associated IS towards a common goal to integrate business, data, information, and technology (Madsen, 2006, p. 2)". While these definitions deal primarily with technical systems, the goals and scope of EA are often more social in nature. Bente et al. (2012) argued that "the people element brings complex behavioural attributes into the functioning of an enterprise..." (p. 35), thus EA "...deals with social elements such as collaborative business processes, organisational leadership, political dynamics and work culture..." (p. 36). This definition was supported by Janssen's (2012) notion of socio-political

factors within EA implementation, which he claimed could be seen as “...a means to inform, guide, direct, and constrain the decisions taken by human beings within organizations” (p.25).

Based on the findings of the EA literature review (Table 2.1), most EA definitions (EA theories, methodologies and frameworks) prior to 2009 tended to emphasise the technological and business aspects and did not discuss the specific social contexts of implementation. Anderson and Backhouse (2009), in their JISC report (Joint Information Systems Committee in United Kingdom), wrote:

[EA] provides an evolving, dynamic way of describing and aligning the functional aspects of an organisation, its people, activities, tools, resources and data/information, so that they work more effectively together to achieve its business goals. EA is also about achieving desired future change through design. It holds that by understanding existing information assets, business processes, organisational structures, information and application infrastructure (the 'as is' state) it is possible to 'do something different' (the 'to be' state) (p. 8).

Implementation of an effective EA program involves dealing with a number of pitfalls (Van Den Berg & Van Steenberghe, 2006). It becomes even more difficult when an organisation does not consider the social context until it becomes an issue (Janssen, 2012; Anderson & Backhouse, 2009). Misconceptions continue to swirl around definitions of EA and what it delivers in terms of business benefits. As declared by Fairhead and Good (cited in Saha, 2009) “...there is no generally accepted definition on architecture (p. 266).

Table 2.1 EA Definitions in EA Contexts

Definitions	Literature	EA Context	
		Technology & Business	Social
From EA Theory/Methodology/Existing Research:			
A holistic representation of all the components of the enterprise (or organization), and the use of graphics and schematics are used to emphasize all	Benson, Bugnitz and Walton (2004)	✓	

Definitions	Literature	EA Context	
		Technology & Business	Social
the parts of the enterprise and how they are interrelated.			
A complete expression of the enterprise; a master plan which "acts as a collaboration force" between aspects of business planning such as goals, visions, strategies and governance principles; aspects of business operation such as business terms, organisation structures, processes and data; aspects of automation such as information systems and database; and the enabling technological infrastructure of the business such as computers, operating systems and networks.	Schekkerman (2004)	✓	
The organizing logic for business processes and IT infrastructure, reflecting the integration and standardization requirements of the company's operating model.	Ross, Weill and Robertson (2006)	✓	
Relates organizational mission, goals & objectives to work processes and to the technical or IT infrastructure required to execute them.	Urbaczewski and Mrdalj (2006)	✓	
A guide for an enterprise's business processes and the associated IS towards a common goal and to integrate business, data, information, and technology.	Madsen (2006)	✓	
The structure of an enterprise, consisting of the relationships among its ICT systems, the external properties of those ICT systems, and the way these create emergent properties with added value for the enterprise.	Zarvi'c and Wieringa (2006)	✓	
A coherent set of descriptions, covering a regulations-oriented, design-oriented and patterns-oriented perspective on an enterprise, which provides indicators and controls that enable the informed governance of the enterprise's evolution and success.	Land, Proper, Waage Cloo, and Steghuis (2009)	✓	
The (usually recursive) structural and functional composition of components of a collection of organisations, where the organisations have a common set of (essentially functional) goals. This definition therefore positions structure as a function-enabler and as such it's subservient, while placing clear emphasis on functional objectives of the enterprise and its constituents that are geared to meeting the objectives (or a coherent related set of them) of the enterprise.	Bhagwat cited in Saha (2009)	✓	
A coherent whole of principles, methods, and models that are used in the design and realisation of an enterprise's organisational structure,	Lankhorst (2009)	✓	

Definitions	Literature	EA Context	
		Technology & Business	Social
business processes, information systems, and infrastructure.			
A high-level, strategic technique designed to help senior managers achieve business and organisational change. It provides an evolving, dynamic way of describing and aligning the functional aspects of an organisation, its people, activities, tools, resources and data/information, so that they work more effectively together to achieve its business goals.	Anderson and Backhouse (2009)	✓	✓
A framework for the business to add new applications, infrastructure, and systems for managing the lifecycle and the value of current and future environments. Enterprise Architecture provides alignment across business strategy, IT strategy, and IT implementation. It tightly integrates the business and IT strategies to create an ongoing way to use IT to sustain and grow the business.	Godinez, Hechler, Koenig, Lockwood, Oberhofer, and Schroeck (2010)	✓	
EA is a means to inform, guide, direct, and constrain the decisions taken by human beings within organizations. Architecture is the description and prescription of a set of elements [people, processes, systems, and technology] and the relationships between them.	Janssen (2012)	✓	✓
The representation of the structure and behaviour of an enterprise's IT landscape in relation to its business environment. It reflects the current and future use of IT in the enterprise and provides a roadmap to reach a future state. EA deals with a socio-technical system. The people element brings complex behavioural attributes to the functioning of an enterprise.	Bente, Bombosch and Langade (2012)	✓	✓
From EA Framework:			
A logical structure for classifying and organizing the descriptive representations of an enterprise that are significant to the management of the enterprise, as well as to the development of the enterprise's systems (Zachman Framework)	Zachman (1987)	✓	
A normative restriction of design freedom and operationally a set of design principles (The Netherlands Architecture Forum-NAF)	xAF working group: Extensible Architecture Framework version 1.1 cited in Land et al. (2009)	✓	
A set of principles, rules, standards, and guidelines, visualising and expressing a vision and implementing concepts, containing a mixture of style, engineering, and construction principles (Capgemini Framework).	Capgemini EA framework cited in Land et al. (2009)	✓	

Definitions	Literature	EA Context	
		Technology & Business	Social
An integrated framework for evolving or maintaining existing information technology and acquiring new information technology to achieve the agency's strategic goals and information resources management goals (The Clinger–Cohen Acts)	US Federal Enterprise Architecture Framework cited in Land et al. (2009)	✓	
Encompassing all of its information and technology services, processes, and infrastructure – to optimise across the enterprise wide systems, the often fragmented legacy of data processes (both manual and automated) into an integrated environment that is responsive to change and supportive of the delivery of the business strategy (TOGAF)	TOGAF (2011)	✓	
A discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analysing the execution of change toward desired business vision and outcomes. EA delivers value by presenting business and IT leaders with signature-ready recommendations for adjusting policies and projects to achieve target business outcomes that capitalize on relevant business disruptions. (Gartner Framework)	Gartner Framework cited in Saha (2014)	✓	

2.3 Understanding Industry Perspectives on Enterprise

Architecture Failure

In this section, resistance to EA and the failure of EA implementation are discussed from an operational viewpoint (focusing on the tasks and activities within architecture operational elements, and the management required to conduct architectural operations), followed by an academic perspective. Table 2.2 shows Gartner's (2009) ranking of the ten most common failures in EA implementation in order of importance. The final column gives an indication of the focus of this study, as it provides a starting point for investigating potential success mechanisms to counteract common failures.

Table 2.2 Ten Common Failures in EA Implementation

No.	Common Failures	Gartner's Arguments	Possible questions for this study
1	Chief architect is an ineffective leader.	The lead architect may understand EA well, but has ineffective leadership skills that even a good organisational structure and staffing levels cannot overcome.	How can leaders engage individuals at all levels in leading the success of EA implementation?
2	Insufficient stakeholder understanding and support.	This happens when employees outside the EA team do not participate in the EA program, EA content is not used in projects, and management questions its value.	To what extent can social communication secure executive-team support? What role do these stakeholders play in EA implementation?
3	EA not engaging the business people.	When IT and business goals are not aligned, the resultant problems will include non-technical people trying to make technical decisions while enterprise architects become too reactionary and tactical in response to projects.	Is a necessary mechanism for success the involvement of enterprise architects in the development of the business context? How should EA management engage jointly with the ultimate end-users?
4	EA group focuses only on technical-domain architecture.	This dated EA approach is still in use in some organisations and is even narrower in scope than technical architecture.	To what extent can program mechanisms provide a much-needed broader focus than solely the technical architecture?
5	EA group does current-state EA first.	Successful EA provides prescriptive guidance but current-state EA does not, so it delays delivery of EA value and hinders the creation of good future-state EA. It does not establish the business context and then focus first on future-state EA.	To what extent does current-state analysis hinder successful EA implementation?
6	The EA group does most of the architecting.	This is a pitfall because the EA content is typically off the mark as it was not informed by those on the business side. As a consequence, there is no buy-in. The primary job of architects is to lead the EA process rather than impose EA content on the organisation. They should form	What structures, mechanisms and tools can encourage user involvement and shared understanding and commitment?

No.	Common Failures	Gartner's Arguments	Possible questions for this study
		virtual teams to create content and seek consensus on the content.	
7	Not measuring and not communicating the impact.	The value of EA is often indirect, so it may not be obvious to everyone in the organisation. This exposes the EA program to the risk of failure. The enterprise architect has to determine ways to effectively communicate the value of EA in a simple way.	How to measure and communicate the impact of EA on ultimate end-users? How do people reflexively judge the relevance of EA for themselves? Do different reflexive types assess value differently and if so, what mechanisms can help their acceptance?
8	Architecting the 'boxes' only.	Enabling better business agility and integration is key but architecting standards for the 'boxes' (business units) in process, information, technical and solution models doesn't address this. Integration and interoperability standards are high EA priorities and must account for more than just technical architecture.	How should architects allow for the particular technical and social characteristics of impacted business units?
9	EA group does not establish effective EA governance early.	Enterprise architects must resist the temptation to wait for more architecture content before setting governance processes, and instead develop content and governance in parallel.	How can governance be best represented and applied to different stakeholder groups?
10	EA group does not focus sufficiently on communication.	Key messages about EA are not intuitively obvious, so enterprise architects must work to educate the business.	What communication mechanisms need to be put in place?

Gravesen (2012) found that EA implementation is still considered immature, and many organisations remain ambivalent or sceptical. This is because the term EA means little to most executives and many view it as simply another IT-related acronym that rarely delivers all of the promised benefits. Even amongst IT practitioners and enterprise architects, misconceptions prevail around the definition of EA and what it delivers in terms of business benefits, which causes further ambiguity in attempts to explain its value. Bloomberg (2014),

also reported that “...responsiveness benefits that EA has purported to deliver have been few and far between. Stories of stalled or misdirected EA initiatives vastly outnumber bona fide examples of EA efforts leading to measurable business value.”

From an academic perspective, Boh et al. (2003) argued that most EA research does not focus on standards management within organisations and suggested this lack of attention could be the cause of EA failure. Boh et al. (2003) hypothesises that effective management of integration architecture standards should govern the interactions of architects, IT personnel and line management, and should be driven by the business goals. It recommends a matrix structure for architecture teams, with different levels of information exchange and collaboration between all stakeholders to produce positive outcomes. Raadt et al. (2008, p. 19) concluded that “efficient collaboration between architects and EA stakeholders is one of the main critical success factors for EA. The basis for efficient collaboration between architects and EA stakeholders is mutual understanding”. These authors went on to explain that most EA research focuses on the role of the architect, with little attention paid to the EA stakeholder, which could explain why effective EA implementation may appear to be a daunting task and potentially fail. Another study of EA compliance by Čyras and Riedl (2012) found that organisations encountered problems with IT compliance issues which were too large and too complex for any one organisation to solve. This occurred because most organisations, through their enterprise architects, adopted the simplest of EA frameworks for the sake of usability, and as a result, focused on few real-world IS issues.

2.4 Enterprise Architecture Implementation Challenge and Governance

Several challenges related to governing change arise throughout the development, evolution and implementation of EA. A top-down approach is common, since management support and financial resources are vital for bringing about sustainable change. However, more recent investigations concluded that the trend in EA implementation to attack from the top down (the CxO perspective) does not have a significant impact on the success of the program. For example, Bente et al. (2012) found that:

Any optimization for EA needs to make sure that all stakeholders are on board and that they remain involved along the way—the business, the IT crowd on the ground, management, and the enterprise architects themselves. This idea can be summed up in two main challenges:

- How can we structure EA activities on a day-to-day basis in order to master a demand driven workflow at all levels of operation and achieve a holistic result?
- How can we elicit the participation of all, in particular the ground-level stakeholders, to balance the helicopter view and the ground-level perspective?

Our answer to these questions is to introduce lean, agile, and participation concepts into EA (pp. 26 – 27).

Bente et al.'s (2012) investigation is strongly linked to Land et al.'s (2009) concept of EA governance as a bottom-up approach in order to understand the consequences at a lower level and translate them into effects at a higher level. Land et al. (2009, p. 1) defined enterprise as “...a goal-oriented cooperative to be implemented by people and means” and “...the key drivers for these means therefore are the enabling of informed decision making on these changes, as well as ensuring compliance to these decisions.” These authors viewed the EA program as a means of governing the changes.

The TOGAF (2011) concept of exponential growth in governance challenges focused on the scope of the enterprise as one of the main challenges of EA:

The scope of the enterprise, and whether it is federated, will determine those stakeholders who will derive most benefit from the enterprise Architecture Capability. It is imperative that a sponsor is appointed at this stage to ensure that the resultant activity has resources to proceed and the clear support of the business management. The enterprise may encompass many organizations and the duties of the sponsor are to ensure that all stakeholders are included in defining, establishing, and using the Architecture Capability (p. 59).

Janssen's (2012) assumptions are useful for evaluating the TOGAF (2011) extrapolation of governance challenges. He suggested EA approaches demand capabilities that go beyond methodology and framework, although these are necessary, and concluded:

The key to relational capability is to ensure voluntary and collaborative behaviour based on mutual trust and goodwill. Stakeholder participation should balance the IT and business involvement and ensure the resolving divergent perspectives and stakeholders' conflicts. Relational capabilities should stress the shared learning and dialogues among all stakeholders. This should ensure that EA are understood and will be used." [Thus], "There is a need for governance structures and mechanisms through which stakeholder influence can be tunnelled and understood (p. 34).

Ross et al. (2006) described the important role of program mechanisms in EA implementation, and suggested a focus on mechanisms can provide a basis for understanding the contextual factors that drive such large-scale architectural transformation. These researchers recommended using different management mechanisms, as stakeholders might view EA implementation as an unnecessary constraint on their current projects.

As described in Figure 2.1, Ross et al. (2006) argued the three different levels of governance within the program: the companywide level, the business unit level, and the project team level should all be coordinated. At the company level the system establishes high-level goals and incentives and might share certain mechanisms, such as executive commitment and budgeting. They proposed decision-making processes at this level should be driven by the program; at the business unit level the linking mechanisms will ensure that the architecture reflects and informs the goals and priorities of all parties (see Figure 2.2); while at the project team level, the architecture will ensure that all projects align with the program.

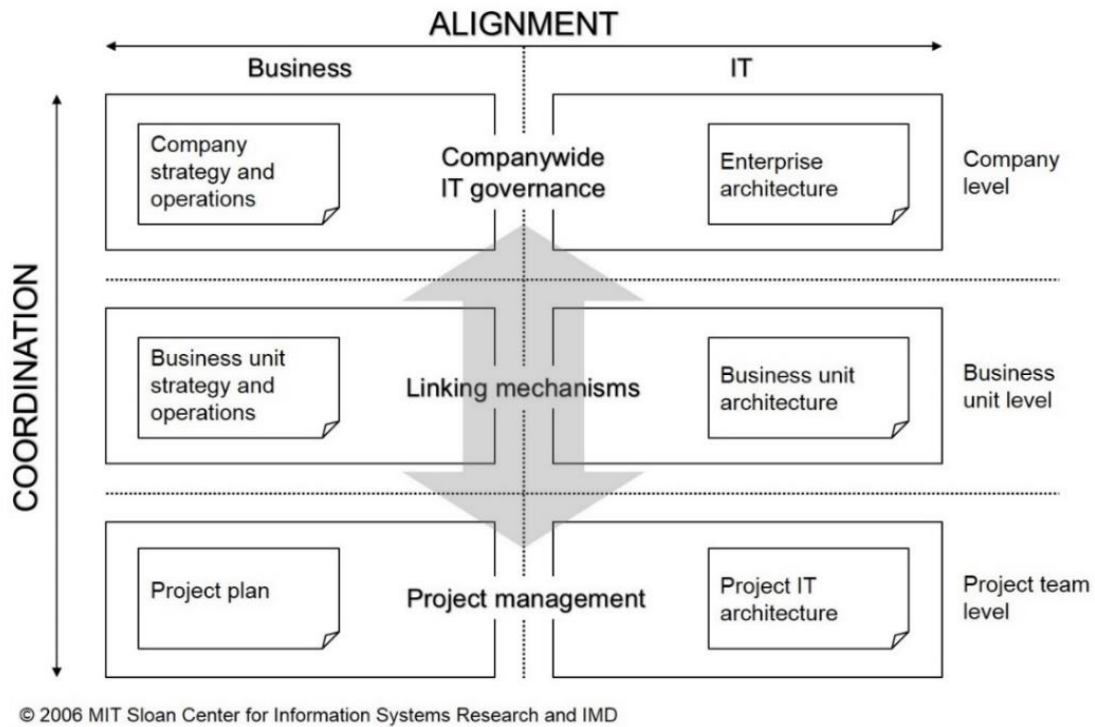


Figure 2.1: The Systems of Governance Mechanisms (adapted from Ross et al., 2006, p. 120)

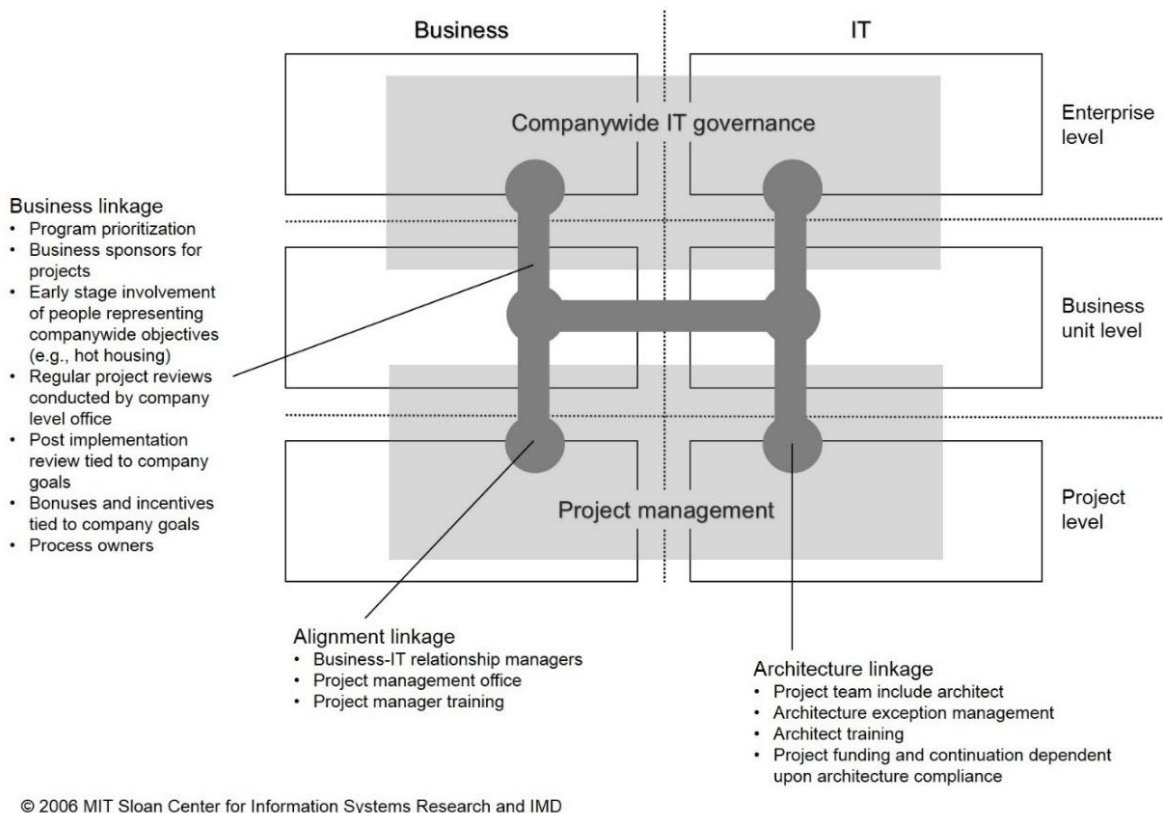


Figure 2.2: Types of Linking Mechanisms (adapted from Ross et al., 2006, p. 128)

Figure 2.2 shows the three important types of linking mechanisms for any system of governance, referred to by Ross et al. (2006, p. 128) as the IT Engagement Model. These are a) the architecture linkage; b) the business linkage; and c) the alignment linkage. Ross et al. proposed these linking mechanisms should also be applied to companywide governance and business-unit projects:

These three types of linking mechanisms address the key alignment and coordination concerns of the company as long as key stakeholders take responsibility for them – and IT governance and project management are effective (p. 128).

The architecture linkage encompasses multiple mechanisms for connecting IT governance decisions about architecture goals and the project design. These include a) the architecture review board; b) the architect training program; and c) the architecture exception processes. In the same way, the business linkage also incorporates two mechanisms for coordinating unit projects and architecture transformation efforts: a) the process of designing and updating the business architecture; and b) incentive programs to guide behaviour as new projects demand new ways of thinking. Business linkage ensures that business goals are effectively translated into project goals. The alignment linkage ensures ongoing communication and negotiation between IT and business concerns – why the changes are needed – the motivation, the anticipated benefits of the change, where changes are expected to be made, and what the expected changes may be (Spragg, 2015). This alignment linkage is comprised of multiple mechanisms as follows: a) project management office; b) training and certification; and c) metrics for assessing the project.

In summary, these program mechanisms (or theories) play an important role, not only in terms of the implementation itself, but also in terms of obtaining consensus from the stakeholders touched by it. Some program mechanisms may be considered an instrument of the technical context, while others are focused on the particular context of EA. In terms of this study which views EA as a social program, understanding such theories within the social context of EA implementation is helpful to determine the conditions under which program mechanisms may or may not work.

2.5 Enterprise Architecture Implementation in the Higher Education Sector

There are limited empirical studies on EA implementation in the higher education (HE) sector. One extensive EA research project was undertaken by the Joint Information Systems Committee (JISC, 2008) in the United Kingdom, they provided funds for the project since the beginning of 2008, to allow early adopters (education institutions: i.e. universities, colleges) to explore the use of EA in the HE sector. In this JISC research project, Anderson and Backhouse (2009, p. 26) conducted an in-depth investigation into the extent to which HE differs from industry “and whether or not the differences make it a ‘special case’ in terms of EA”. They concluded that “...the vision for EA in HE needs to be brave and bold. Making a success of EA within the sector will require an uncompromising focus on the big picture vision, both within institutions and across the sector (p. 1).” According to Anderson and Backhouse (2009) the major concern is whether HE as a sector “is ready to listen to the benefits of EA.” They identified that:

Various project staff expressed concern that senior management are worried about a general ‘initiative overload’ and EA would simply be one more acronym to deal with. Related to this were concerns about the naturally conservative nature of universities, which find institutional change difficult. This can lead to problems over getting decisions on and articulating the 'to be', big picture vision. Also, TOGAF [the implementation framework used in this EA research project] assumes that some of the key strategic and business vision cornerstones are in place prior to inception of an EA programme and sometimes this is not the case in HE (p. 26).

With respect to the naturally conservative nature of universities highlighted above, it could be argued that EA implementation in the higher education sector is unique. As explained by Anderson and Backhouse (2009) “...the collegiate system, common among older university, follows a highly federated ‘community of scholars’ model” (p. 8), which would find institutional change difficult. They also wrote:

...evidence from the commercial world indicates that the kind of business change that EA sets out to generate can only happen when senior management are fully engaged with EA work and are driving it from the top. However, this type of approach does not sit easily within the often highly decentralised HE environment. Indeed, there is often a cultural tension in HEIs [higher education institutions] between top-down and bottom-up that does not exist in industry to anything like the same extent and this poses a particular challenge to the implementation of EA in HE (p. 9).

Another interesting state of affairs to emerge from the JISC research project is the social interaction at the structural level. Anderson and Backhouse (2009, p. 9) found:

One point that did seem to get common agreement was to start EA work by focusing on 'central' processes that everyone uses, most likely key administrative systems such as Human Resources and Accounts. This was partly a pragmatic decision that came out of the rejection of areas such as teaching and learning where it was generally felt that there was so much diversity, for example in pedagogy models, that getting a consensus that could be acted upon would be difficult.

It appears EA implementation in the higher education sector presents particular challenges that need to be addressed, most notably issues associated with participation of stakeholders (people), and often unknown social circumstances (structure and culture). A different way of implementing EA may therefore be appropriate for the HE sector as outlined by Anderson and Backhouse (2009):

There was general consensus that identifying stakeholders is of primary importance to the start-up of EA. Identifying key actors and decision makers has been shown to generate debate within an institution and this is clearly one of the benefits of embarking on EA work. However, a particular problem is that some roles within universities vary so widely. What can we say is a researcher? Many participants thought it was important to focus less on labels within organisations, since roles and responsibilities do not always

follow the label, and to look more carefully at who makes what decisions (p. 28).

These factors contribute to how key TOGAF concepts have been implemented within various departments in a university. As identified by Anderson and Backhouse (2009), the industry cases were so dissimilar to the HE setting in the UK that it sparked debate about scope and what constitutes an enterprise. For instance, the enterprise scope within a university and “whether that should be across the entire institution, at departmental level or even at the level of a single, cross-campus project” was a matter of contention. As a result, JISC put extra work into refining the scale and complexity of work involved, specifically in applying TOGAF as the implementation framework. Table 2.3 presents a number of key questions raised by JISC, while the final column gives an indication of the focus of the current research study from TOGAF *EA continuum*^{2,3} perspectives. This EA continuum provides recommendations for investigating potential success mechanisms to answer key JISC questions.

Box 2.3: Enterprise Architecture Continuum

Architecture continuum: A repository of architectural elements with increasing detail and specialization. This Continuum begins with foundational definitions like reference models, core strategies, and basic building blocks. From there it expands to Industry Architectures and all the way to an organization’s specific architecture. TOGAF (2011, p. 21)

Enterprise continuum: A categorization mechanism useful for classifying architecture and solution artifacts, both internal and external to the Architecture Repository, as they evolve from generic Foundation Architectures to Organization-Specific Architectures. TOGAF (2011, p. 25)

Table 2.3 Main Challenges of EA Implementation in the Higher Education Sector

(adapted from Anderson and Backhouse (2009, p. 9))

No	Key Question	EA Continuum Views of TOGAF
1	What is the correct scope to initially work at: the whole institution, an individual department or single project?	Architecture vision, principles, and strategic goals.
2	Who should be involved in the process as stakeholders and what level of senior management commitment is required?	Architecture governance, communication and stakeholder management.
3	Should an institution start with the 'as-is' aspect of EA or the 'to-be'?	Architecture compliance and conformance within its domains: business, data, application, and technology.
4	Does HE have the level of business planning and strategic vision required by the 'to-be' phases of EA?	Architecture compliance – target architecture.

Below is a summary of key EA lessons identified by the JISC research project (Anderson & Backhouse, 2009, p. 34):

- Governance of the EA process is extremely important.
- Architecture work should not be the sole preserve of the IS department.
- There is a tendency to focus EA work on systems and technologies, but actually the big areas of work involve people and their day-to-day work processes.
- Keep EA work and those doing it tightly integrated and communicating with the rest of the organisation: it is easy to develop an 'ivory tower' mentality.
- Approach EA work with a view that it is an enabling and empowering tool rather than a management 'control' tool.
- Understand and articulate the institution's core operating model.
- It is very important to get senior management engaged with EA work.
- All institutions have an architecture, but without formal EA work it is not modelled, mapped or understood.

- Avoid agonising over a governance infrastructure, select something and then fine-tune as things go along.

2.6 Enterprise Architecture Adoption: Technical Capability versus Social Intervention

EA programs can be understood as the implementation of changes within certain contextual guidelines. As explained by Van den Berg and Van Steenberghe (2006), most of the implementation will be a reflection of management's belief that the program can only realise its promise when the architectural thinking is adopted by those who initiate and execute the changes, such as sponsors, business managers, IT managers, project managers, information analysts, designers, builders and administrators. However, as identified by Bente et al. (2012), the evidence in EA adoption to date is contradictory. Among stakeholders there will almost certainly be a group that thinks EA is worth the trouble in view of the IT complexity and continuous changes in technology, since people must relearn processes and will influence current projects and affect existing solutions. Ross et al. (2006) found commitment to technical capability did not translate into the IT application with the best fit in terms of functionality, because it did not align with stakeholders' personal projects. It therefore comes as no surprise that for EA to be used as an instrument to steer change, the social context must be embedded into the relevant change processes.

In view of the challenges posed by social intervention, it can be argued that EA doesn't only deal with technical aspects such as IT systems and infrastructure, since the enterprise context is represented by people within an organisation who, amongst other things, use IT to do business. Some of the social interventions identified in the literature, such as the social structures and cultural attributes of the people element in the functioning of an enterprise are: stakeholders' collaborative processes (Ross et al., 2006; Boh et al., 2003; Raadt et al., 2008), political dynamics, (Janssen, 2012), effective communication (Gravesen, 2012), and work culture (Bente et al., 2012).

For these reasons it is logical to assume that the social context of EA can help an enterprise to understand the real challenges associated with people issues. It can provide a strategic approach to evolving IT systems that can deal with the social complexity of the environment

and manage the change of its IT systems. EA programs need to find their proper place in complex and unique environments through collaborative development that enables the organisation to better deal with the social interventions of the program. As suggested by Bente et al. (2006, p. 9):

The IT systems [in EA program] must support new ways of doing business collaboratively with partners and customers. The result is a “multi-entity” ecosystem that allows interaction at more touchpoints and a depth not previously attempted.

Janssen’s (2012, p. 28) analysis of organisations’ social structure in EA implementation also looks at collaborative development with a socio-political focus:

...the socio-political perspective on EA looks at other elements like collaborating among stakeholders including aspects such as trust, goodwill, power, and mutual interests. EA is an activity in which many, diverse stakeholders are involved, all having their own objectives. Alignment and integration require understanding of each other’s needs and requirements that go beyond the definition of models at various levels.

Both Bente et al. (2012) and Janssen (2012) explored the relationship between the technical aspects and social context of EA programs, but Janssen’s interpretations includes a socio-political perspective on EA, and other crucial aspects such as creation of a shared vision, communication among stakeholders, and evaluation of the impact as the crucial aspects.

2.7 A Contingency View of People as the Key Element in EA Implementation

According to Ross et al. (2006) a key program mechanism in most organisations is the engagement of senior executives who deal with IT. Their involvement in IT decision making is crucial to establish principles and priorities for IT investment, as they will ultimately motivate use of the program and ensure everyone understands the benefits it will bring. While most people involved in the program attempt to do what they think is right, without a clear direction, shared vision, collaborative process and effective communication, some of their

actions will do as much harm as good (Ross et al., 2006, Boh et al., 2003; Raadt et al., 2008; Gravesen, 2012). Ross et al. (2006, p. ix) found that:

...people make [a] difference. Good people design the operating model, build the foundation, execute, and innovate. But good people need direction, leadership, and incentive to perform at their best.

Janssen (2012) expressed the opinion that EA implementation is not a single activity with a clear beginning and end. He argued EA is influenced by ongoing use and users continually interpret and extend the program and provide feedback for improvement and review, thereby influencing its shape. Similarly, Van Den Berg and Van Steenbergen (2006) stated:

In most cases, the people directly involved have their own personal view of the importance of architecture..." (p. 14), thus, "...the various people involved [in the EA program] have different objectives in mind, expectations may diverge. If this happens, support and approval for architectural practices may disappear (p. 17).

The above arguments are strongly linked to Fairhead and Good's (cited in Saha, 2009) notion of people-led enterprise architecture:

[EA program should] highlights the need to ensure that enterprise architecture, as both a discipline and set of deliverables, recognises the need to focus on people before technology. (p. 285)" Thus, "Architecture is about change, which means that it is about people. It is often stated that people do not like change. This is not necessarily true but it is certain that they hate having change forced upon them without their understanding and involvement (p. 287).

It is evident that implementing EA programs is a hot spot with regard to people issues. As claimed by Janssen and Klievink (2012, p. 29), among the reasons for the failure of EA programs can be grouped into people category such as: undermined motivation, individual capabilities, working relationships, absence of collaboration mechanism, failure to deal with

problems with employees, adding people to a late project, no sponsorship, and change in stakeholders (contractors).

In their EA post-implementation review, Bente et al. (2012, p. 3) concluded: “after exhaustive analysis and many discussions we found that each of the previously described situations boiled down to people issues”. They ascribed this to EA programs on the borderline between business and IT, critically dependent on collaboration between the two (Bente et al., 2012). In a sense it sets the stage for structural and cultural clashes, a meeting point of business people on the one hand and IT people on the other. In this context, the people in EA management (senior executives) play a role as intermediaries in the decision-making processes and in elaborating on drafts from the dialogue between business and IT. Since the scope of EA is larger than enterprise architects can handle, extensive coordination and collaboration is required between the business people and the IT people (Ross et al., 2006; Bente et al., 2012).

In the HE sector, structural and cultural clashes are not only likely between IT and business people, but also between service centres, faculties and schools. These tensions pose particular challenges to the implementation of EA in the higher education sector (Anderson & Backhouse, 2009). As explained by Anderson and Backhouse (2009):

Universities are organisations in which new ideas and technologies are often being developed or experimented with. Individuals in departments are frequently introducing new ways of working [...]. This is clearly not unique to the university sector, but the scale and decentralised nature of it might be, given that one of the primary roles of the sector is to act as 'ideas communities'. [EA] Pilot participants were keen to debate whether and how EA could be dynamic enough to incorporate new developments and 'left-field thinking' (p. 27).

The idea of people as the key element in EA implementation provides a useful vocabulary for examining the overlap between people, processes and technology, particularly in explaining EA adoption in the HE sector. It is therefore important to examine people's perceptions of the

processes and technologies, as their perceptions ultimately lead them to change their habits and routines.

If people do not like the proposed transformation they may reject its implementation. Hence, EA implementation will only be accepted if the program is aligned with their projects and preferred programs. Their perception of the program will determine how they respond to it and consequently, their adoption of EA. It will be interesting to examine the role of internal relationships in the way that programs impact their ultimate decisions about EA implementation.

2.8 TOGAF and the People Element

TOGAF is a detailed method and set of supporting tools for developing enterprise architecture (TOGAF, 2011). It is the most widely used EA framework (judged by published certification numbers) and can be used freely by any organisation wishing to develop and implement EA. Lange and Mendling (2011) endorsed TOGAF as the most referenced EA framework, and more recently, Mueller et al. (2013, p. 3) claimed that TOGAF is “...the widest and most extensive framework for Enterprise Architecture Management (EAM)...” that provides “...methods and supporting resources to improve business efficiency by building suitable EA”. TOGAF has also become the most referenced EA implementation framework for the HE sector (Anderson & Backhouse 2009; JISC 2009b).

One of the challenges of EA is compliance issues (Čyras & Riedl, 2012). The TOGAF framework emphasises the importance of architectural compliance between the architectural specification and ultimate outcomes. Compliance can be seen to vary between non-conformant, fully conformant, conformant, compliant, consistent and irrelevant. Figure 2.3 illustrates the detail of each level of architecture conformance.

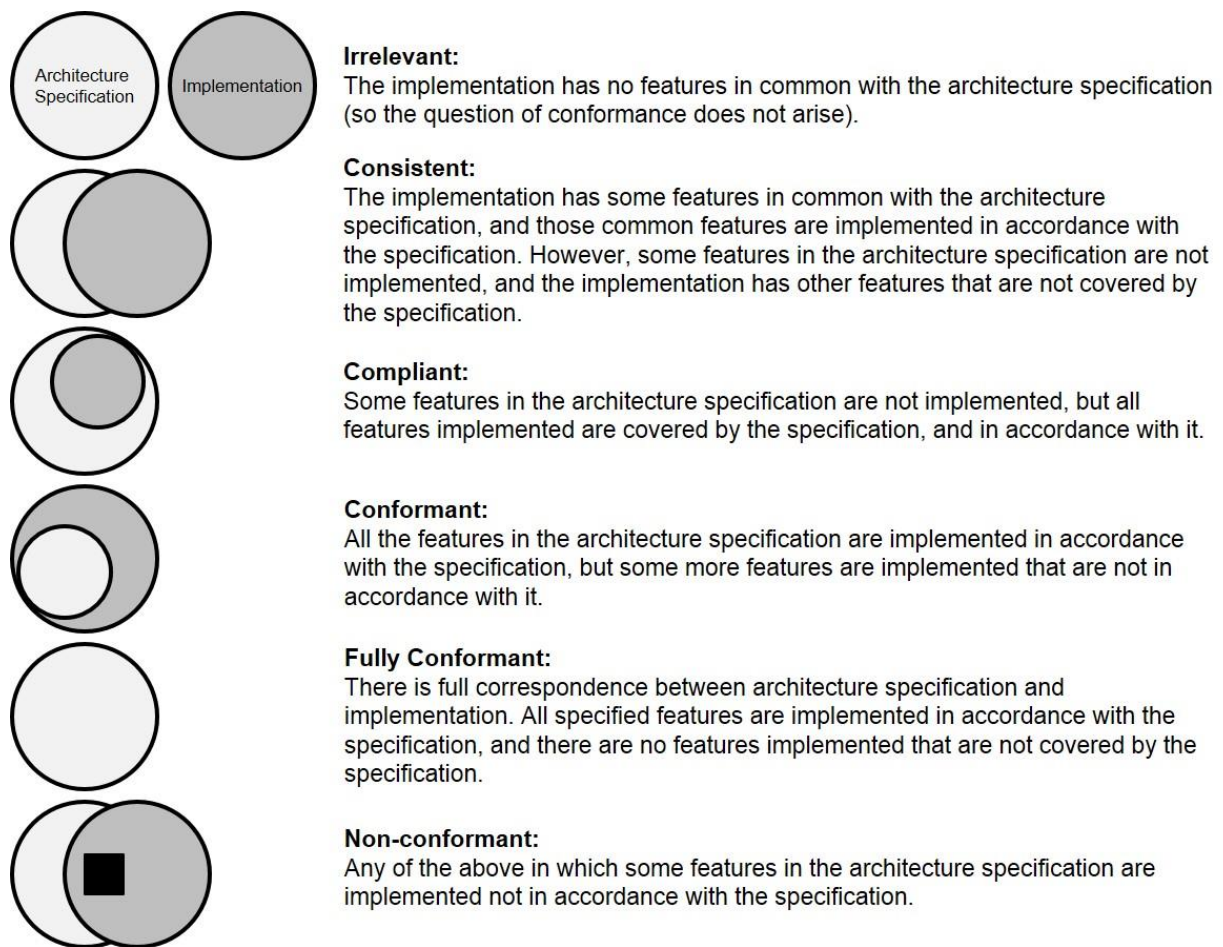


Figure 2.3: Levels of Architecture Conformance (adapted from TOGAF, 2011, p. 560)

Such a view suggests the various levels of non-conformance equate to people's acceptance of the inbuilt structures and mechanisms. As detailed in Table 2.4 below, TOGAF defined various important people elements together with associated responsibilities for achieving conformance. This table provides guidance for the important roles, relationships and mechanisms involved in a TOGAF based implementation.

Table 2.4. 'People' Roles in EA Compliance within EA Implementation

(adapted from TOGAF, 2011, p. 565)

No.	People Role	Responsibilities	TOGAF Notes
1	Architecture Board	To ensure that IT architecture is consistent and support overall business needs	Sponsor and monitor architecture activities
2	Project Leader	Responsible for the whole project	
3	Architecture Review Co-ordinator	To administer the whole architecture development and review process	More likely to be business oriented than technology oriented
4	Lead Enterprise Architect	To ensure that the architecture is technically coherent and future-proof	An IT architecture specialist
5	Architect	One of the Lead Enterprise Architect's technical assistants	
6	Customer	To ensure that business requirements are clearly expressed and understood	Manages that part of the organisation that will depend on the success of the IT described in the architecture
7	Business Domain Expert	To ensure that the processes to satisfy the business requirements are justified and understood	Knows how the business domain operates; may also be the customer
8	Project Principals	To ensure that the architects have a sufficiently detailed understanding of the customer department's processes. They can provide input to the business domain expert or to the architects	Members of the customer's organisation who have input to the business requirements that the architecture is to address

Similarly, Table 2.5 describes the possible milestones to ensure compliance over the period of EA implementation and provides guidance for the important milestones and core events that need to be considered. By observing any anomalous outcomes from these core events, the program can focus on the deep underlying mechanisms for failure or success.

Table 2.5 'People' Interaction and Action in EA Compliance during EA Implementation
(adapted from TOGAF, 2011, p. 566)

No.	People Action	TOGAF Notes	Who (Interaction)
1	Request architecture review	As mandated by IT governance policies and procedures	Anyone, whether IT or business oriented, with an interest in or responsibility for the business area affected
2	Identify responsible part of organisation and relevant project principals		Architecture Review Co-ordinator
3	Identify Lead Enterprise Architect and other architects		Architecture Review Co-ordinator
4	Determine scope of review	Identify which other business units/departments are involved. Understand where the system fits into the corporate architecture framework	Architecture Review Co-ordinator
5	Tailor checklists	To address the business requirements	Lead Enterprise Architect
6	Schedule Architecture Review Meeting		Architecture Review Co-ordinator with collaboration of Lead Enterprise Architect
7	Interview project principals	To get background and technical information: <ul style="list-style-type: none"> • For internal project: in person • For procurement activities: in person 	Lead Enterprise Architect and/or Architect, Project Leader, and Customers
8	Analyse completed checklists	Review against corporate standards. Identify and	Lead Enterprise Architect

No.	People Action	TOGAF Notes	Who (Interaction)
		resolve issues. Determine recommendations	
9	Prepare Architecture Compliance review report	May involve supporting staff	Lead Enterprise Architect
10	Present review findings	To Customer To Architecture Board	Lead Enterprise Architect
11	Accept review and sign off		Architecture Board and Customer
12	Send assessment report/summary to Architecture Review Coordinator		Lead Enterprise Architect

TOGAF does not currently provide a formal maturity model in its documentation, but refers to a number of external maturity models for guidance. One of these is the US Department of Commerce (DoC) *Architecture Capability Maturity Model (ACMM)*^{2,4} designed to aid internal assessments of EA readiness. The goal of this model is “to enhance the overall odds for success of enterprise architecture by identifying weak areas and providing a defined evolutionary path to improving the overall architecture process” (p. 596). It models the cultural and technical readiness for adopting EA practices by proposing 6 maturity levels focused on 9 elements. While many of the elements require people involvement and acceptance, the role of people is not explicitly defined within the framework and the focus is clearly quite technical. Such a limited framework underscores the lack of recognition of the role of people beyond purely technical capacities. Given that TOGAF is the most popular EA framework, it is disconcerting to see so much emphasis placed on powerful management elements and so little on affected stakeholders.

Box 2.4: TOGAF ACMM – Architecture Capability Maturity Model

The DoC ACMM (TOGAF, 2011, pp. 596 – 600) consists of six maturity levels and nine architecture elements. The six levels are:

0. None
1. Initial
2. Under development
3. Defined
4. Managed
5. Measured

The nine enterprise architecture elements are:

1. Architecture process
2. Architecture development
3. Business linkage
4. Senior management involvement
5. Operating unit participation
6. Architecture communication
7. IT security
8. Architecture governance
9. IT investment and acquisition strategy

Level 0: None

No enterprise architecture program. No enterprise architecture to speak of.

Level 1: Initial

Informal enterprise architecture process underway.

1. Processes are ad hoc and localized. Some enterprise architecture processes are defined. There is no unified architecture process across technologies or business processes. Success depends on individual efforts.
2. Enterprise architecture processes, documentation, and standards are established by a variety of ad hoc means and are localized or informal.
3. Minimal, or implicit linkage to business strategies or business drivers.
4. Limited management team awareness or involvement in the architecture process.
5. Limited operating unit acceptance of the enterprise architecture process.
6. The latest version of the operating unit's enterprise architecture documentation is on the web. Little communication exists about the enterprise architecture process and possible process improvements.
7. IT security considerations are ad hoc and localized.
8. No explicit governance of architectural standards.
9. Little or no involvement of strategic planning and acquisition personnel in the enterprise architecture process. Little or no adherence to existing standards.

Box 2.4 cont.: TOGAF ACMM – Architecture Capability Maturity Model

Level 2: Under Development

Enterprise architecture process is under development.

1. Basic enterprise architecture process is documented based on OMB Circular A-130 and Department of Commerce Enterprise Architecture Guidance. The architecture process has developed clear roles and responsibilities.
2. IT vision, principles, business linkages, Baseline, and Target Architecture are identified. Architecture standards exist, but not necessarily linked to Target Architecture. Technical Reference Model (TRM) and Standards Profile framework established.
3. Explicit linkage to business strategies.
4. Management awareness of architecture effort.
5. Responsibilities are assigned and work is underway.
6. The DoC and operating unit enterprise architecture web pages are updated periodically and are used to document architecture deliverables.
7. IT security architecture has defined clear roles and responsibilities.
8. Governance of a few architectural standards and some adherence to existing Standards Profile.
9. Little or no formal governance of IT investment and acquisition strategy. Operating unit demonstrates some adherence to existing Standards Profile.

Level 3: Defined

Defined enterprise architecture including detailed written procedures and TRM.

1. The architecture is well defined and communicated to IT staff and business management with operating unit IT responsibilities. The process is largely followed.
2. Gap analysis and Migration Plan are completed. Fully developed TRM and Standards Profile. IT goals and methods are identified.
3. Enterprise architecture is integrated with capital planning and investment control.
4. Senior management team aware of and supportive of the enterprise-wide architecture process. Management actively supports architectural standards.
5. Most elements of operating unit show acceptance of or are actively participating in the enterprise architecture process.
6. Architecture documents updated regularly on DoC enterprise architecture web page.
7. IT security architecture Standards Profile is fully developed and is integrated with enterprise architecture.
8. Explicit documented governance of majority of IT investments.
9. IT acquisition strategy exists and includes compliance measures to IT enterprise architecture. Cost benefits are considered in identifying projects.

Box 2.4 cont.: TOGAF ACMM – Architecture Capability Maturity Model

Level 4: Managed

Managed and measured enterprise architecture process.

1. Enterprise architecture process is part of the culture. Quality metrics associated with the architecture process are captured.
2. Enterprise architecture documentation is updated on a regular cycle to reflect the updated enterprise architecture. Business, Data, Application, and Technology Architectures defined by appropriate de jure and de facto standards.
3. Capital planning and investment control are adjusted based on the feedback received and lessons learned from updated enterprise architecture. Periodic re-examination of business drivers.
4. Senior management team directly involved in the architecture review process.
5. The entire operating unit accepts and actively participates in the enterprise architecture process.
6. Architecture documents are updated regularly, and frequently reviewed for latest architecture developments/standards.
7. Performance metrics associated with IT security architecture are captured.
8. Explicit governance of all IT investments. Formal processes for managing variances feed back into enterprise architecture.
9. All planned IT acquisitions and purchases are guided and governed by the enterprise architecture.

Level 5: Optimizing

Continuous improvement of enterprise architecture process.

1. Concerted efforts to optimize and continuously improve architecture process.
2. A standards and waivers process is used to improve architecture development process.
3. Architecture process metrics are used to optimize and drive business linkages. Business involved in the continuous process improvements of enterprise architecture.
4. Senior management involvement in optimizing process improvements in architecture development and governance.
5. Feedback on architecture process from all operating unit elements is used to drive architecture process improvements.
6. Architecture documents are used by every decision-maker in the organization for every IT related business decision.
7. Feedback from IT security architecture metrics are used to drive architecture process improvements.
8. Explicit governance of all IT investments. A standards and waivers process is used to make governance-process improvements.
9. No unplanned IT investment or acquisition activity.

Source: TOGAF (2011, pp. 596 – 600)

Despite these issues, many of TOGAF's overall goals offer potential synergies to guide EA development of technology and standards, particularly in the HE sector (Anderson & Backhouse, 2009). For example the *ADM*^{2.5}; a methodology that provides a step-by-step process for developing and implementing an EA program.

Box 2.5: TOGAF ADM – Architecture Development Method

The TOGAF ADM provides a tested and repeatable process for developing architectures. The ADM includes establishing an architecture framework, developing architecture content, transitioning, and governing the realization of architectures.

All of these activities are carried out within an iterative cycle of continuous architecture definition and realization that allows organizations to transform their enterprises in a controlled manner in response to business goals and opportunities. (TOGAF, 2011, p. 10)

The ADM attempts to increase usability and provide additional help with the process of EA within the HE sector. However, consideration should also be given to how ADM is introduced to HE staff, as described below (Anderson & Backhouse, 2009, p. 20):

- Avoid 'analysis paralysis' – there is a certain amount of 'learning by doing' involved in using TOGAF and project teams should not be overly worried about getting it catastrophically wrong;
- Select somewhere to start and get going;
- Develop a basic skeleton of the architecture before filling in too much detail (it is common for beginners to try to put in too much detail);
- Avoid the temptation to try and fully complete each step of the ADM before starting others;
- Make use of a suitable standards-compliance and tool;
- Acknowledge that TOGAF can be adapted to fit the specific situation within an organisation.

Anderson and Backhouse (2009, pp. 20-21) also reported the following specific benefits from using TOGAF for architectural compliance:

- Communication and governance-related benefits of having a structured method in place for architectural work. Conflicts between stakeholders will inevitably arise and TOGAF, to a degree, offers a way of reaching a compromise across the institution;
- A focus on the requirements of users and stakeholders, by, for example, placing this at the centre of its framework model, which helps to enable communication across the campus. These user requirements tend to have permanence over and above technical solutions and allow some continuity;
- Architectural principles and attendant templates provided by TOGAF were very useful. The templates provided in the documentation forced projects to express and communicate the rationale behind institutional business and technology decisions at a high level.

2.9 Summary

This study views people as a key element of EA implementation, and accordingly people are recognised as subjects, not objects. The literature review does look at other important mechanisms not specifically related to “people” since they will also play a role in the explanatory target of the study. However, people-focused mechanisms have been emphasised and people-focused theory is used to explain how EA was examined. In doing so, the study has theoretically placed mechanisms at the centre of the research, to understand the theories and social context of EA implementation and to define program mechanisms and the contexts for success and failure in the higher education sector.

As a social program, EA requires investigation of the program mechanisms built into implementation and the social mechanisms constituting the context within which the program operates. This helps to understand how and why the program works or fails to work. A review of the current literature highlighted the centrality of program mechanisms and suggested a focus on mechanisms to provide a basis for understanding the contextual factors

that drive large-scale architectural transformation. It is widely recognised that EA encompasses numerous goals, various products and dimensions (Janssen, 2012), which could explain the many views on program mechanisms. The diversity of possible program mechanisms is also reflected in the terminology used in the EA literature. Potential success mechanisms identified in the EA literature can be seen in Table 2.6 below.

Table 2.6 Potential Success Program Mechanisms Identified from EA Literature Review

Program Mechanism	Role as a Mechanism	Literature
Individuals' engagement	To ensure that all stakeholders are on board and remain involved along the way - the business people, the IT people on the ground, management and the end-users themselves.	1. Gartner (2009) 2. Bente et al. (2012)
Stakeholders' role	To change stakeholders' perceptions of the architecture by addressing their concerns and requirements; and by identifying the trade-offs that will need to be made to reconcile their potentially conflicting concerns.	1. Ross et al. (2006) 2. Gartner (2009) 3. Anderson and Backhouse (2009) 4. TOGAF (2011) 5. Bente et al. (2012) 6. Janssen (2012)
Governance	To ensure business and IT projects achieve objectives at: a) at companywide level, b) at business unit level, and c) at project team level.	1. Ross et al. (2006) 2. Anderson and Backhouse (2009) 3. TOGAF (2011) 4. Bente et al. (2012) 5. Janssen (2012)
Linkage	To ensure that the architecture reflects and informs the goals and priorities of all parties through: a) architecture linkage; b) business linkage; and c) alignment linkage.	1. Ross et al. (2006)
Collaboration	To ensure the EA program supports new ways of doing business collaboratively with partners and customers so that the result is a "multi-entity" ecosystem that allows interaction at more touchpoints and in more depth.	1. Ross et al. (2006) 2. Gartner (2009) 3. Bente et al. (2012) 4. Janssen and Klievink, (2012)
Communication	To ensure ongoing communication	1. Gartner (2009)

Program Mechanism	Role as a Mechanism	Literature
	and negotiation between IT and business centres – why the changes are needed (the motivation), the anticipated benefits, where the changes are expected to be made and what the expected changes may be. This mechanism also assures sufficient stakeholder understanding and support.	2. Anderson and Backhouse (2009) 3. Gravesen (2012) 4. Bente et al. (2012)
Compliance	To ensure various important people and their associated responsibilities adhere to architectural compliance over the period of EA implementation.	1. TOGAF (2011) 2. Čyras and Riedl (2012)
Conformance	To ensure all features in the architecture are implemented in accordance with the specifications.	1. TOGAF (2011)
Shared vision	To ensure that EA principles, business linkages, baseline, and target architecture are identified.	1. Janssen (2012)
Sociopolitical	To ensure all political aspects such as trust, goodwill, power, and mutual interests of stakeholders are embodied in the EA implementation, from the creation of a shared vision to communication with stakeholders and impact evaluation.	1. Janssen (2012)
Leadership	To understand the importance of communication and team building as key critical success factors. A combination of social skills, business focus, IT literacy, and an ability to lead are crucial to the success of EA programs.	1. Ross et al. (2006) 2. Gartner (2009) 3. TOGAF (2011)

A review of the EA literature revealed gaps in existing knowledge and led to the formulation of the research questions as a basis for exploring the interplay between structures, cultures and agency (Chapter 4). The following chapter examines EA from various social critical realist perspectives, and solidifies the use of critical realism as the underlying philosophy for this examination of the social factors and their impact on EA implementation.

CHAPTER THREE: WHY CRITICAL REALISM?

AN EXAMINATION OF ENTERPRISE ARCHITECTURE FROM A SOCIAL REALIST PERSPECTIVES

3.1 Overview

The previous chapter provided reasoned evidence from the literature to support the premise that successful implementation of enterprise architecture (EA) requires organisation-wide collaboration with a strong focus on social impacts. This chapter discusses EA and its implementation from the social science perspective. The first section examines the different versions of social realism theories, their underlying focus on ontology (the nature of its theoretical perspective) and the methodological/theoretical implications that should be considered. It describes the fundamental implications of the research process and the ultimate outcomes. As Archer (1995) argues:

In any field of study, the nature of what exists cannot be unrelated to how it is studied. This is a strong realist statement, which I endorse, but cannot explore here. Instead, I want to examine the more modest proposition that what is held to exist must influence considerations about how it should be explained. In other words, what social reality is deemed to consist of (and what is deemed non-existent) do affect how its explanation is approached (p. 16).

The maintenance of a consistency between ontology and methodology is important in understanding the targets and goals of research:

...the social ontology endorsed does play a powerful regulatory role vis-a-vis the explanatory methodology for the basic reason that it conceptualizes social reality in certain terms, thus identifying what there is to be explained and also ruling out explanations in terms of entities or properties which are deemed non-existent. Conversely, regulation is mutual, for what is held to exist cannot remain immune from what is really, actually or factually found

to be the case. Such consistency is a general requirement and it usually requires continuous two-way adjustments between ontology and methodology to achieve and to sustain it as such (p. 17).

The next section examines the distinction between the terms used for mechanisms in various social realism theories, and describes which definition is most suitable for each purpose. Underpinned by a critical realist perspective, this section also provides a social definition of generative mechanisms and describes the role of program mechanisms, and abduction in explaining non-observable events and non-events generated by mechanisms. The final section of this chapter examines the contextual influences of the ontological, theoretical and mechanistic frameworks, and substantiates the use of critical realism as the underlying philosophy of the study and why it is appropriate for the objectives of the research.

3.2 A Social Realist Perspective in Examining Enterprise

Architecture

The aim of this thesis was to examine deeply the sociological aspects of EA implementation at the university under study. Such examination requires looking beyond everyday events to find the deep causal mechanisms involved. Nash (1999, p. 449) suggested:

The purpose of sociology is to explain social events and processes. If explanations are tied to ontology, as the argument has suggested then it is necessary to decide what social entities are real and how that reality can be described and demonstrated.

The following section examines a number of realist approaches, all fundamentally in agreement with the critical realist approach proposed by Bhaskar, with a focus on the implications of the different arguments for EA examination.

3.2.1 Bhaskar's philosophy of critical realism

Bhaskar's concept of critical realism (CR) distinguishes three ontological domains in reference to social reality: the empirical, the actual and the real. Morén and Blom (2003) suggested:

The empirical domain consists of what we experience, directly or indirectly. This domain is distinct from the actual domain where events happen whether we experience them or not, because what happens in the world is not the same as that which is observed. This domain is in turn different from the real domain, where we also find the forces, mechanisms, which can produce events in the world. [Thus] ...abstractions are not to do with actual events, but deal with what produces them (p. 44).

It is useful to examine TOGAF from a critical realist perspective. TOGAF (2011) was also the implementation framework used by the organisation under study. The Open Group Architectural Forum has developed TOGAF over many years by disseminating and encouraging its use and providing certification opportunities. The certification program involves examination following self-directed study or attendance at certification courses. Such an approach to learning follows the traditional, teacher-centred [objectivist] instructional learning model in that it sees learning as concerned with transmission of knowledge, as being individual and involving a process of information reception, storage, retrieval and comparison with others (Brown, 2009, p. 11). It differs from the student-centred [social constructivist] learning approach which is "concerned with meaning-making, is social and involves a process of internal and social negotiation (dialogue) and sharing with others" (Jonassen & Land, 2000, as quoted in Brown, 2009, p. 11). Brown (2009) compared these two common approaches to learning using a critical realist approach and argued for an "ontological turn" in education. Brown's (2009) argument for a critical realist approach to learning has synergies with the traditional objectivist use in enterprise architecture, which can be seen as an accumulated repository of knowledge that provides knowledge acquisition opportunities. TOGAF (2011) assigned two meanings to "architecture" depending upon the context: "1) A formal description of a system, or a detailed plan of the system at component level to guide its implementation; and 2) The structure of components, their inter-

relationships, and the principles and guidelines governing their design and evolution over time” (p. 9).

Brown (2009) agreed that such an objectivist representation has benefits for education:

The strengths of objectivism are that it accounts for the objective character of public knowledge and for direct transmission as a teaching/learning process; it does not account for variations in students’ construction of meaning. Because constructivism does account for this variation, it would seem to provide a preferable account of knowledge that is fluid, non-propositional and subjective, that is, based on personal rather than external (objective) criteria. However, constructivism does not provide a coherent account of objective knowledge; indeed, strong versions of constructivism deny it (p. 13).

In contrast to these positions Brown proposed a shift to a critical realism ontology which he termed an “ontological turn” in educational theorising, concluding “...in critical realism it is the ontology that enables and constrains the acquisition of knowledge, that is, learning” (p. 14).

In a similar fashion, it could be argued that a focus on the ontology of EA, its meaning and the context of its application can provide a new, less-objectivist perspective. Seen from this viewpoint the enterprise environment is not predefined; it provides a set of conditions that enable and constrain adoption. The adoption environment is real and intransitive and therefore “a) it exists whether or not we have (fallible) knowledge of it, and (b) its elements have causal powers or susceptibilities or tendencies” (Brown, 2009, p. 17). CR thus emphasises the context in which EA is developed and used, requiring a clear representation of the EA “knowledge” or artefact repository, the EA “knower” or stakeholder, and the process of “knowing” or developing and applying EA knowledge in the context of the knower. Consequently, the focus in such a representation is contextual, and seeks to understand the social elements that constrain and enable the effective transmission and use of EA knowledge.

3.2.2 The morphogenetic approach and reflexivity: Theories of critical realism

Archer (2013a, p. 9) described the morphogenetic approach (MA) as a methodological complement for CR:

All theories have a social ontology, whether implicit or explicit, which effectively defines the constituents of the social world. Therefore, the SO [social ontology] performs a role of conceptual regulation because it governs those concepts that are deemed admissible in description as in explanation—just as an atheist cannot attribute his well-being to divine providence. In itself, a social ontology explains nothing, although it may exclude certain explanations, cast in ‘improper’ terms. In itself, an SO tells no one how to go about explaining anything. For this an explanatory programme is needed. That is what the Morphogenetic Approach is; the methodological complement of Critical Realism, which is its meta-theoretical social ontology.

To emphasise the contribution of MA, Archer described the “morpho” element as an acknowledgement that society has no pre-set form or preferred state, while the “genetic” part is recognition that it takes its shape from, and is formed by, agents, originating from the intended and unintended consequences of their activities. MA provides direction for critical realist interpretation in that it reflects the fundamental CR assumption that social systems require an analytical separation between macro (structural) and micro (agency) dimensions and that: (a) structure necessarily pre-dates the action(s) leading to its reproduction or transformation, and (b) structural elaboration necessarily post-dates the action sequences that gave rise to it (Archer, 1995; Dobson, Jackson & Gengatharen, 2011). This analytical separation of structure and agency in order to explain is a consequence of the different nature of the two: “people and society ...do not constitute two moments of the same process. Rather they refer to radically different things” (Bhaskar 1989, p. 76). Thus, an educational system can be centralized, while a person cannot, and humans are emotional, which cannot be the case for structures” (Archer 2010a, p. 275). Through analytical dualism the study can separate “structure” (social systems, institutional structures, roles, and positions) and “agency”

(groups, collectives and individuals) and examine their interplay to account for the structuring and re-structuring of the social order. This is possible because structure and agency are different kinds of entities, with different emergent properties and powers, despite the fact that they are crucial for each other's formation, continuation and development.

In her MA, Archer assigned a central role to mechanisms and emphasised the recognition of their role over time by introducing a temporal element: the important macro-micro, micro-micro and micro-macro mechanisms are placed in context over time.

Alwadain et al. (2013) recommended the use of MA as an explanatory program for examining the evolution of EA because its analytical separation of structure and agency over time provides a powerful framework for examining the social complexity of EA implementation as the various macro-micro situational mechanisms, the micro-micro interaction mechanisms and the micro-macro transformational (or reproduction) mechanisms play out over time (Figure 3.1). This socio-cultural focus provides clear opportunities for examining the interplay of the various mechanisms and their roles in structural change.

Archer's MA can also be used more broadly to examine the interplay between the cultural (people ideas, thoughts, beliefs and values that influence their work) and the socio-cultural practices (habitual actions, established routines, traditional preserves or conventional divisions of activities: Archer, 1988). For Archer, the cultural and the socio-cultural form two interacting morphogenetic cycles (Figure 3.1) that have profound and ongoing impacts on each other, and thus on the social outcomes. The extent to which the socio-cultural and cultural are in harmony define various situational logics that "predispose agents towards specific courses of action for the promotion of their interests" (Archer 1995, p. 216). The environment within which the university operates (that is, the organisation under study) can be seen as a microcosm of the discontinuity evident in the greater society that Archer described.

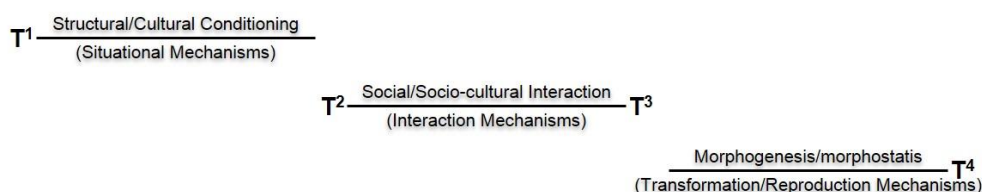


Figure 3.1: Morphogenetic/Morphostatic Approach (Archer, 1995, p. 193)

In similar fashion, Archer's examination of the role of individual reflexivity has relevance to an examination of EA adoption. It is interesting to speculate about the various reflexive modalities prominent in universities today, each with its own different responses to change. For example, her conclusions concerning the increased role of the autonomous reflexives within today's morphogenetic society can be extended to the university context, as autonomous reflexives adopt "...a strategic stance towards constraints and enablements; they seek to avoid society's 'snakes' and to climb its 'ladders'. They thus aim to improve upon their social positioning and, if successful, become upwardly socially mobile". In the same way it could also be a meta-reflexive: if the academic staff of a university seek personal advocacy rather than a career, they will be compelled by the need to make a difference in their field of study rather than simply meeting their immediate needs and desires. As Archer's most recent research indicates (Archer, 2014; Archer, 2015), the adoption of such a "people reflexivity" approach encourages a focus on how EA needs to support the personal projects of staff in order to have the best chance of success. It is now useful to examine other forms of social realism to better understand the strength of CR. The next section briefly examines prominent social realist approaches Bunge's emergent systemism and analytical sociology.

3.2.3 Bunge's realist philosophy of emergent systemism

According to Wan (2012), Bunge's emergent systemism describes "...the ontological status of supra-individual actors (cohesive social groups) as concrete systems with novel causal powers, a bonding structure, and specific mechanisms that make it behave as a unit in certain respects..." (p. 1555). The aim of Bunge's ontology is to provide "...a completely general model of concrete systems of any kind, living or non-living" which constitutes a general framework for understanding supra-individual actors as concrete systems with emergent properties and causal powers. Bunge argued a social system is "...ultimately the aggregate outcome of individual actions", and thus "...the features of a social system depend upon the nature, strength, and variability of social relations, which in turn are reducible to social actions" (Wan, 2012, p. 1548). Bunge made it clear that binding social relations are concrete connections among people, in relations of competition, cooperation, trade and employment (Kaidesoja, 2009, p. 310).

Kaidesoja (2009, p. 309) further demonstrated that Bunge’s social systems possess emergent properties such as “...structure, cohesiveness, stability, stratification, norms, coordination, division of labor, and distribution of wealth, that are not properties of the individual agents”, but properties of a social group (a collection of individuals that share certain features, held together by connections, bonds, or forces of some sort in cohesive social groups in an organisation). The organisation is conceived as a structured system that behaves in certain respects as a whole and interacts with other social organisations. From this perspective, Bunge provides valuable insights into the human social systems evident within the university. Such a perspective provides useful guidance for the examination of the emergent properties of particular faculties, schools, and service centres as social groups. Based on this view structure constitutes the properties of a particular group or entity – it is the properties of that material group rather than a separate thing. Structure is to do with being a property of a system, and as described by Wan (2012), the analytical separation is more related to system and agent rather than to structure and agent evident in CR. The emergent properties of systems have causal powers in the social world, and this view seemed most appropriate for analysing the animosity of the various centres, schools and faculties towards the implementation of EA.

3.2.4 Analytical sociology

According to Hedström and Ylikoski (2010) analytical sociology emphasises the importance of mechanism-based explanations to help social scientists avoid some philosophical pitfalls – “the mere adoption of mechanism talk will not suffice” (p. 58).

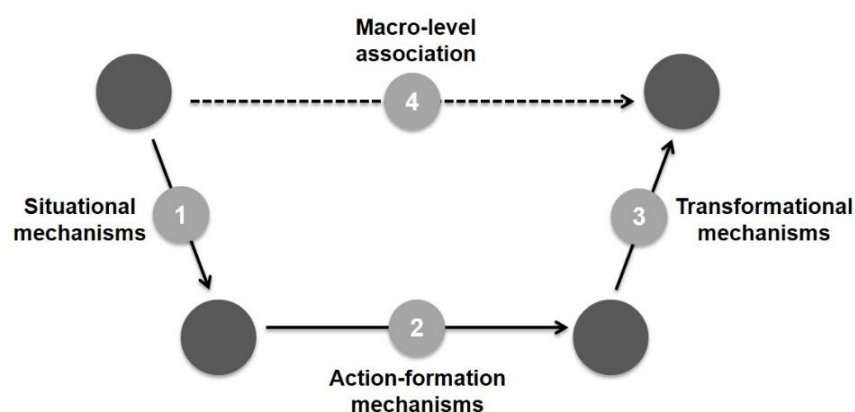


Figure 3.2: A Typology of Social Mechanisms (adapted from Hedström and Ylikoski 2010, p. 59)

Figure 3.2 shows Hedström and Ylikoski's (2010, p. 59) mechanism-based explanation that can never include solely macro-level mechanisms. They suggested:

A basic point of the mechanism perspective is that explanations that simply relate macro properties to each other (arrow 4) are unsatisfactory. These explanations do not specify the causal mechanisms by which macro properties are related to each other. Deeper explanatory understanding requires opening up the black box and finding the causal mechanisms that have generated the macro-level observation. Rather than analysing relationships between phenomena exclusively on the macro level, one should identify the situational mechanisms by which social structures constrain individuals' action and cultural environments shape their desires and beliefs (arrow 1), describe the action-formation mechanisms linking individuals' desires, beliefs, etc., to their actions (arrow 2), and specify the transformational mechanisms by which individuals, through their actions and interactions, generate various in-tended and unintended social outcomes (arrow 3). Only by understanding the whole chain of situational, action-formation, and transformational mechanisms have we made sense of the observed macro-level relationship.

The aim of analytical sociology is to explain "...complex social processes by dissecting them, accentuating their most important constituent parts, and constructing appropriate models to understand the emergence of what is observed" (Wan 2012, p. 1545). Wan suggested that the commitment of analytical sociology to the importance of micro and individuals in the causal reconstruction of the processes that give rise to given collective phenomena, has encouraged efforts to bring to the fore mechanism-based explanation grounded in a realist approach to causality (p. 1546). Whilst the approach has been criticised for its exclusive focus on the causal role of the micro and individuals in social mechanisms; it can nevertheless provide a useful way of representing the role of individuals and examining their interactions with existing structures.

3.2.5 The different under-labouring roles of social realism for enterprise architecture examination

Foundational realist ontology is crucial for building a theoretical explanation of the key role of people in EA implementation. The different under-labouring roles of social realism in EA examination present different arguments about the basic conditions to test for the existence of the phenomena studied. Since the role of theory in research is so decisive (Danermark, Ekström, Jakobsen, & Karlsson, 2002) it has a significant impact on how EA is examined. As Archer (2015) argues that social theories and approaches should be examined as to their commitment to structure (S), agency (A) and culture (C). Ideally approaches should not be “Lite” in any of these areas. Table 3.1 shows the different under-labouring roles for such examination.

Table 3.1 Different under-labouring roles of social realist for EA examination (Summarised around social realist conceptions of social reality and Archer (2015) investigations on the processes of change)

Theory	Focus			Roles
	Structure	Agency (People)	Culture	
Morphogenetic Approach	Heavy	Heavy	Heavy	Macro and Microscopic theme
Emergent Systemism	Medium	Heavy	Lite	Microscopic theme
Analytical Sociology	Lite	Heavy	Lite	Microscopic theme

The analytical sociology approach (Figure 3.2) appears similar to Archer's MA at a schematic level (Figure 3.1). However, unlike Archer's argument (morphogenetic approach) for examining the macro-micro level between the structural, cultural and agency in creating change, analytical sociology focuses on the micro elements of the change process. The “macro level” of analytical sociology is only perceived as a constraint on individual action, and thus rejects strong ontological version of structural-cultural emergence. Archer (2015) expressed the opinion that within analytical sociology “...the resemblance is only superficial, not only because social structures are treated as weakly emergent, but also because human persons are treated as “rational actors” [that is, methodologically individualistic] (p. 30)”. Equally important, Archer (2015) explained:

...the analytical sociology is epistemologically realist but not ontologically realist, [thus], [Analytical sociology] admits the existence of non-observable sub-individual level entities and process (e.g., conflicting desires and rational choices) while denying the existence of supra-individual entities and processes on the grounds that they are not observable. In this regard, [analytical sociology] is still empiricist and not fully realist (p. 31).

In the same way, Bunge's Emergent Systemism denies the power of culture to operate within the social reality. Bunge focused on supra-individual actors (cohesive social groups) and viewed social structure as a property of social groups, where culture is a part of the structure itself. As identified by Archer (2015): "Bunge's oscillation between the Cultural System and its logical relations, and Socio-Cultural interaction and its use of ideas to influence social relations, means he denies culture the power to operate as a generative mechanism..." (p. 10). By affording supra-individual actors the central (microscopic) theme, he claims that the analytical separation is more related to social system (in which the social structure is also located, along with other social components (e.g. cohesiveness, stability, stratification, norms, coordination, division of labour, and distribution of wealth)) and agent, rather than the structure and agent in CR.

To theorise about the role of people in an explanatory study, it is inadequate to focus only on one or two part(s) of a social reality in which people are at its core. This is the "structure" (people situations in their social systems, institutional structures, roles, and positions); the "culture" (people ideas, thoughts, beliefs and values that influence their work); and the "people" themselves (groups, collectives and individuals), which are intertwined with each other (Archer, 1995). In researching the role of people, this study emphasises the interplay between structure, culture and people (agency) as the basis for explaining people's adoption of EA practices, by identifying the mechanisms which hinder and encourage architecture transformation. Accordingly, this study adopted a viewpoint that treats mechanisms as ontological in providing an account of how the underlying mechanisms work in the three overlapping ontological domains that define social reality (Archer, 1995). This representation in Archer's MA was useful for building a theoretical explanation in this study of the role of people as a key element in EA implementation.

3.3 The Important Role of Mechanisms in Social Explanation

The aim of social science to provide a social explanation for the role of mechanisms has a long history “...but only in recent decades has this idea been an object of more systematic study” (Bechtel, 2006, as cited in Hedström & Ylikoski, 2010, p. 50). Hedström and Ylikoski (2010) identified many definitions of “mechanism” conceived by researchers in different fields of study “because the entities and processes studied by different sciences are quite heterogeneous, it is difficult to propose a mechanism definition that would both be informative and cover all examples of mechanisms” (p. 50). Similarly, Archer (2015, p. 3) stated: “...there are now at least 24 definitions of mechanisms in social theory (Mahoney, 2001)”, largely within a ‘realist mechanistic framework’. Hence, it is important to clarify which is most usable for a specific study, and which definition is most suitable for that purpose (Van Den Berg & Van Steenberghe, 2006). The following section examines a number of realist approaches, all fundamentally in agreement with the critical realist approach, and their different definitions of “mechanism”, as well as the associated implications of each definition.

3.3.1 Social mechanisms from various social realist perspectives

Bhaskar (1978; 1986, as cited in Demetriou, 2009, pp. 4-5) defined “mechanism” as “ontologically linked to structure, within a view of reality that features structural pluralism at various levels, thus holds mechanism to be that aspect of the inner and environmental structure of a thing by virtue of which the thing has a certain power”. According to Bhaskar a mechanism operates when triggered and normally endures longer than any pattern of events it triggers.

In contrast, Bunge defined a mechanism as “...the collection of processes that occur within a system (and often among systems in the case of the social world), bring about (or block) its transformations, and alter (or maintain) its structure” (Wan 2012, p. 1557), whereby the ontological concepts of system and mechanism are defined in terms of each other. According to Demetriou (2009, p. 5), “...Bunge sees mechanisms essentially as constituent events, while Bhaskar sees it as power-affiliated reality that is over and above any pattern of events it generates”. He added: “...despite any differences of the definition of mechanism [...], Bunge and Bhaskar are on the same page when describing the complexity in which mechanisms

operate” (p. 6). Unlike Bhaskar’s (1978) deep realist scheme of structure and its complexity in relation to the ontology of causality, Bunge’s (2003) realist concept of emergent systemism, as described in Wan (2012), provides a contrasting perspective to that of the critical realist by suggesting that “structure” is a property of a system rather than a “thing” in its own right. Seen from this viewpoint “social structure” stands for “the set of relations among members of a given social system and among items in the system’s environment, and the total social structure of a society is defined as “the union of its biological, economic, political, and cultural structures” (Bunge 1998a: 66). Since (social) structure is “a set (or collection) of relations, it is a concept, not a concrete thing such as an organism, a person, or a group” (p. 1550).

Differentiating entities from structures allowed this study to handle distinctions between the causal powers of unions, for example qua-entities, and the norms and regulations or qua-structures around them. There was found to be value in this differentiation between entities and structures in examining the resistance of certain faculties and service centres towards EA. The custodian of IT Services in University X (the organisation under study) spoke about the likelihood of a different response from Teaching and Learning to the rules and regulations imposed by the EA program, mainly due to this entity’s different properties from other centres. As such, their adoption of EA structuring processes and regulations may prove more problematic. This is supported by Anderson and Backhouse’s (2009, p. 9) conclusion that implementation of an EA program in the higher education sector would be difficult.

While such discussion may strengthen the argument that various “entities” will respond differently to the EA structure imposed, the lack of focus of Bunge’s Emergent Systemism on the causal powers in cultural/socio-cultural to operate as a generative mechanism, can cause difficulty in identifying the cultural environments that influence people (agency) by constraining and enabling certain habits and routines. Kaidesoja (2009, p. 308) argued that Emergent Systemism focuses only on two levels of an organisation’s complex system at one time:

...in studying social organizations it is often useful to methodologically distinguish the following two levels of analysis: (i) the members of the organization and their interactions, and (ii) the organization conceived as a structured system that behaves in certain respects as a whole and interacts

with other social organizations. This model, then, is abstracted both from the subsystems of the individual members of the organization (e.g. mental systems and personality) and the supersystems (e.g. economy or state) of which the organization forms only one part. Due to these abstractions, the explanatory power of this kind of model might be rather limited, since subsystemic and supersystemic processes may also be important in explaining events and processes that take place in social organizations (Bunge 1998, 73–79).

Hedström's (2005) focus on mechanisms was instrumental in developing a new approach to social investigation titled analytical sociology. Whilst this approach has been criticised for its exclusive focus on the causal role of micro and individuals in social mechanisms, it nevertheless provides a useful way of representing the role of individuals and examining their interactions with existing structures. As Hedström and Bearman (2009) argued, analytical sociology can be used as a strategy for understanding the social world, and can explain the important social facts, such as network structures, patterns of residential segregation, typical beliefs, cultural tastes, and common ways of acting, through social mechanisms. Manzo (2010, p. 139) described it thus:

...a mechanism can legitimately constitute the basis for a general theoretical proposition provided that it is shown to be at work behind different phenomena and, for each of them, appears under various spatial-temporal conditions involving actors with heterogeneous identities, beliefs and action logics.

Such subtly different perspectives on mechanisms can offer significantly different explanatory foci, because the seemingly small differences between the various ontological representations provide different avenues for explanation. No single platform is sufficient – all have their own benefits and disadvantages. EA implementation in universities has its own uniqueness given the social complexity of the university environment. Analysis of such a complex social environment is difficult and should include an investigation of the interplay between structures, cultures and agency (people), all fundamental components of social reality. The goal of this section is therefore to define CR and the theories (in particular Archer's

Morphogenetic Approach) that can be used to build a theoretical explanation of the role of people as a key element in EA implementation.

3.3.2 Generative mechanisms in social explanation under critical realist perspective

According to Bhaskar's definition, a generative mechanism (Bhaskar, 1979; 2008 as cited in Archer, 2015, p. 3) is "a way of generative complexes", therefore the mechanism provides the real basis of causal laws and hence causal explanation. Detailed arguments, presented by Archer (2014), suggest that "generative mechanisms are a key concept in the realist ontology on which the present analysis of normativity is based [...]". She defines them as "...the emergent causal powers of related entities within a system" (p. 195). Archer clearly demonstrates the terminology of generative mechanisms as follows:

Firstly, there is nothing 'mechanistic', in the sense of deterministic, about the notion of 'mechanisms'. Indeed, while mechanisms acting in closed systems will generate event regularities, mechanisms active in open systems will generate tendencies against which other (often unknown or even unknowable) mechanisms may countervail. Thus, the use of the word mechanism does not preclude the use of 'reflexivity' or the attribution of creative agency to people. Secondly, mechanisms play a central role in explanations, as distinct from mere descriptions. Indeed, while analyses confined to the level of description will comprise (typically interesting) successions of or association between events, explanations must also include both an identification and a discussion of those mechanisms held to be minimally sufficient to account for the situation described to be the way it is and not otherwise (see Lawson 2003, pp. 86–109 on contrast explanations). Thirdly, mechanisms are typically nested into one another. To my knowledge, there is no way of proving ontologically that this nesting has an end and does not lead to infinite regress. From an epistemological perspective, we know that we have reached a satisfactory explanation not when we have identified all the mechanisms at play (while excluding other hypotheses) but rather when we have outlined sufficient mechanisms (and

excluded alternative hypotheses) to answer the question at hand. In other words: every mechanism can be used both as explicans (that which explains) and as explicandum (that which is being explained) (pp. 195 – 196).

In similar fashion, Mayntz (2004) expressed the opinion that:

“The term “mechanism” is used both to designate a certain class of real phenomena (mechanisms are such and such, they do such and such) and to designate a class of (causal) propositions referring to such phenomena. (p. 239)” Thus, “...the search for mechanisms starts not with a correlation but with the identification of an explanandum. The term “generative mechanism” underlines this explanatory strategy. Processes generally do not come as discernable, “given” units; they have no naturally given beginning and end. (p. 244)”

Another essential point about generative mechanisms also articulated by Archer (2015, p. 2):

... ‘generative mechanisms’ are required to (a) explain such associations (i.e. how they arose and work) and (b) are robust enough to account for cases and times when no such ‘constant conjuncture’ can be found (i.e. Y is not significantly correlated with Z) but do not entail scrapping the mechanism itself.

From a critical realist perspective, generative mechanisms always exist in several diverse elements (i.e. structure and culture) and thus are in interplay with one another (Archer, 2015, p. 3).

Based on the concept of Bhaskar’s generative mechanism, Blom and Morén (2011, p. 63) argued:

...the generative mechanisms that explain how and why the events happened are only accessible indirectly by developing theory in relation to those mechanisms. Clearly, the mechanisms are not less real for not being directly observable, but exist (in the domain of the real) whether we conceptualize them or not. Accordingly, this type of explanatory knowledge

demands a theoretical language that penetrates the empirical surface and forges contact with the reality that exists beneath the level of events.

In the same way, Archer (2015, p. 70) pointed out that generative mechanisms are located in the domain of real:

...the realist generative mechanisms do not operate at the level of events but at the 'real' and unobservable level of the factors (structure, agency, culture) working together in that relation.

EA is regarded as the starting point for the process of change, and is conceived of as generative mechanisms that produce tendencies towards change in the relational organisation of the social order. As explained by Blom and Morén (2011) "...generative mechanisms actually exist in the social world, but they are to be regarded as potential or tendencial (p. 63)." Obviously generative mechanisms underline the explanatory focus of the CR philosophy and can be used to examine the social mechanisms surrounding the architecture, as the identified generative mechanisms leading to architecture transformation (or not) will be traceable from the architecture events. The mutual connection between the generative mechanisms can explain the underlying success of large architecture transformation, or known in MA terms as a "synthetic" picture of social transformation (or reproduction) (Archer, 2015).

3.3.3 The role of 'program mechanism' from a critical realist perspective

Astbury and Leeuw (2010) described the important role that mechanisms play in social programs and policy and suggested a focus on mechanisms can explain "...how and why programs work (or fail to work) in different contexts and for different program stakeholders. This is where the explicit use of mechanisms can play an important role in assisting theory-oriented evaluators to articulate more precisely the causal linkages between programs and their desired effects" (Astbury & Leeuw, 2010, p. 364). These authors defined mechanisms as "...underlying entities, processes, or structures which operate in particular contexts to generate outcomes of interest" (p. 368).

To critical realists, mechanisms are seen as sensitive to variations in context, since a mechanism may or may not be activated in a particular context due to contingent conditions or possible countervailing mechanism(s). The important role of mechanisms for evaluating social programs was studied by Pawson and Tilley (1997), who differentiated between the mechanisms built into the program design (also referred to as the “program measures” or the “program mechanisms”) and the social mechanisms, constituting the context within which the program operates. They recommended an important focus on understanding the theory underlying the program design, such theory being important in understanding and explaining program outcomes. The bottom line of program evaluation is to determine under what conditions the program theory might work or not – that is “what works”, “for whom” and “in what circumstance”. Understanding the theory underpinning program implementation is helpful in deriving the mechanisms by which change is achieved. Mechanisms are a fundamental part of a critical realist explanation – they provide the causal possibilities within any social program.

These objectives help to understand some of the mechanisms built into the EA implementation program, such as the various consultation groups and support mechanisms to facilitate frequent input from stakeholders. Given such aims, it is important that the underlying philosophy and associated social focus allow a clear representation of such elements in the EA program. It is also important to properly examine the success of these program mechanisms to fully appreciate the success of the program.

3.3.4 The role of ‘abduction’ in explaining the non-observable events and non-events generated by mechanisms

In critical realist studies, abduction plays a vital role in explaining and proposing the creative use of theory for deriving suitable explanation. For example, for non-observable events and non-events generated by mechanisms abduction requires creativity and imagination. Mingers (2011, p. 4) suggested:

Abduction is the point where novelty, innovation and creativity enter the scientific method, as indeed they must. With deduction, we get nothing more than the consequences of the premises – but where did they come

from? With induction, we just get a generalisation from the observations we have made – but how do we know they are all that matters? However, with abduction we get explanation and the possibility of new knowledge.

Abduction is consistent with a depth of realism “...where explanation is not about prediction, but about the steady unearthing of deeper levels of structures and mechanisms” (Dobson, Jackson & Gengatharen, 2013, p. 7). Similarly, Wad (2001, p. 2) suggested:

If we take explanation to be the core purpose of science, critical realism seems to emphasise thinking instead of experiencing, and especially the process of abstraction from the domains of the actual and the empirical world to the transfactual mechanisms of the real world.

In short, abduction plays a major role in critical realist analysis, since such an approach often requires transcending, or speculating, which may be used to identify non-observable events and non-events (in the domain of actual) generated by the mechanisms (in the domain of real) to explain the architecture events that have occurred (in the domain of empirical).

3.4 Summary

Having briefly described EA examination from a social realist perspective and how the different arguments have associated implications, this researcher came to the conclusion that a critical realist perspective was suitable for achieving the objectives of the research. There were two main reasons for underpinning the study with a CR philosophy.

Firstly, as mentioned earlier, in the past two decades, the higher education sector in Australia has moved towards corporatisation, marketisation and rationalisation (Gengatharen et al., 2009) as universities faced significant challenges due to market change, new teaching models and the need for efficiencies, all of which required changes in technology capability. EA effectively addresses these challenges by providing a holistic view of the planning and development of an organisation’s business, application and technology architecture. Recognising the importance of people in EA implementation requires acceptance of EA as a social program, heavily influenced by the structural and cultural systems surrounding the architecture. Thus, if this study was to follow other realists who do not endorse the value of

structure, culture and agency (people) to the same extent, then its explanatory context may not be fully realised. The morphogenetic approach (MA), as a complementary methodology for critical realism, deals with the components of structure, culture and agency and seeks to make these components methodologically traceable. In terms of this study, MA provided an explanation of the generative mechanisms operating between structure, culture and people over periods of time, where the structural and cultural influences were mediated by people shaping the situations in which they subjectively defined a particular course of action (“concern” – people, personal) in relation to their objective social circumstances (“context” – the EA program).

Secondly, and more compellingly, MA is well-suited to the mechanism-based explanation proposed by this research, since its focus is to understand the people-focused mechanisms by identifying the important mechanisms of EA, and building a theoretical explanation of the role of people as a key element in EA implementation. MA provides an account of how the underlying mechanisms work, and was therefore appropriate for this study which required a definition that treats mechanisms as ontological in providing an account of how the underlying mechanisms work. MA can also be used to examine the increasing intensity of social change. For instance, MA allows an examination of social reorientation, perhaps a radical social change/transformation, which involves macro-micro-macro explanations to explain transformation (morphogenesis) rather than stability (morphostasis), and vice versa. Moreover, the premise that people play a key role in successful EA implementation has the potential to change the way it is approached in future.

The following chapter presents the key concepts and theories of a critical realist perspective, most notably the morphogenetic approach and reflexivity theory, and describes how the adoption of each has fundamental implications for the research objectives and ultimate outcomes. Chapter four also looks at the dynamics of the complex social program surrounding the architecture, and presents the research questions identified from the literature review.

CHAPTER FOUR: THEORETICAL APPROACH – EXAMINING ENTERPRISE ARCHITECTURE FROM A CRITICAL REALIST PERSPECTIVE

4.1 Overview

The aim of this chapter is to explain the key concepts and theories identified in the previous chapter, and describe how each has a bearing on the research objectives and ultimate outcomes. The first section of this chapter discusses the key concepts of critical realism, and is followed by a literature review of critical realist perspectives on information systems research. The next section discusses the morphogenetic approach (MA); the role of situational logics and enterprise architecture (EA) pathways; the possible social mechanisms identified from the situational logics; and describes the central role of reflexivity theory in EA implementation programs. The final sections respectively discuss the dynamics of the complex social programs surrounding the architecture and the research questions formulated from the literature review.

4.2 A Critical Realist Perspective in Information Systems Research

The adoption of critical realism has significant implications for the objects to be investigated, the progress of the research and the outcomes that can be expected. In applying such a focus to EA implementation, this study required a deep understanding of the structural and cultural systems, the mechanisms currently in place, and how the stakeholders react to the new impositions, both in terms of increased governance and its impact on the way things are currently done.

As a complementary methodology for CR, Archer's Morphogenetic Approach (MA) provides direction for critical realist interpretation in that it reflects the fundamental critical realist assumption that social systems require an analytical separation between macro (structure) and micro (agency) dimensions. Such an approach provides an important link between realist ontology and practical social-information systems outcomes, and forms a consistent

foundation for ontology and methodology. In order to better understand the research process, it is important to understand critical realism (CR).

Bhaskar's (1978) concept of CR distinguishes among three ontological domains in reference to social reality: the empirical, the actual and the real. The empirical domain consists of events that are actually perceived or experienced directly or indirectly, whilst the actual domain includes events which are experienced or not. Both are encompassed by the real domain, which is made up of structures and mechanisms that are relatively enduring, with potential powers and properties that are activated or triggered in particular contexts or by agency (people) action, and thus may be causal in generating perceived or non-perceived events.

Bhaskar (1978, p. 25) proposed that events or phenomena should not be the core focus of research; instead the focus should be on the structures and mechanisms that generate the phenomena. In the same way, Mingers (2004) argued that CR not only focuses on a specific event observed, but also on what the event can say about the underlying causal relationships (or social mechanisms) that are enduring and lie beyond the common experience (the empirical domain). Figure 4.1 below depicts Bhaskar's three overlapping CR ontological domains.

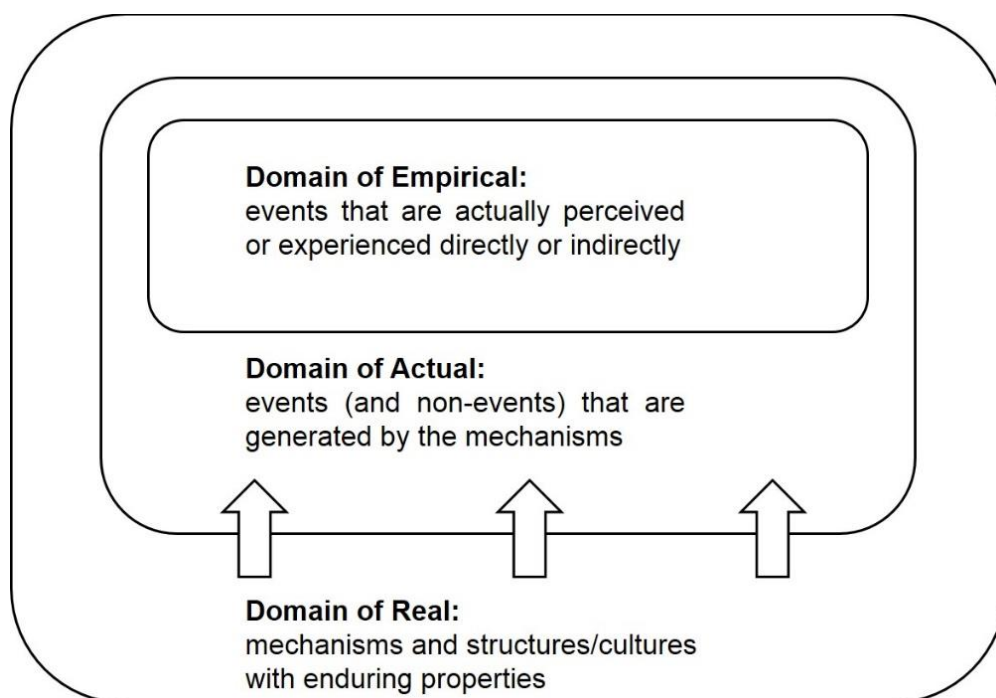


Figure 4.1: The three overlapping domains of reality in CR ontology (adapted from Mingers, 2004, p. 94)

Previous research underpinned by Bhaskar's concept demonstrated that CR is suitable for studying information systems in overcoming some of the difficulties associated with the social contexts (Carlsson, 2006; Horrocks, 2009; Bygstad, 2010; Dobson et al., 2011; Carlsson, 2011; Dobson et al., 2013; Mingers, Mutch, & Willcocks, 2013; Nuryatno & Dobson, 2016, among others).

The use of case study is also well suited to CR-based attempts to find explicit causal explanations for the complex social and organisational phenomena in the IS field (Wynn & Williams, 2008). According to Fox (2009) CR can increase understanding of causal mechanisms and contexts in IS research. Furthermore, the value and importance of CR as a philosophy in IS research was also supported by Pettersen, McDonald and Engen (2009), who acknowledged that CR can address social ontology as a necessary precursor to developing models and empirical accounts of socio-technical systems. Carlsson (2011) expressed the opinion that CR can be useful as an underpinning philosophy for behavioural IS research as well for IS design science research. In addition, Bygstad and Munkvold (2011) indicated CR has an important role in IS research in identifying causal structures of an ontological depth that is difficult to unveil through other alternative approaches (i.e. positivist and interpretivist).

In order to appreciate the importance of CR as a philosophy in identifying possible "people-focused" mechanisms in EA implementation, Table 4.1 below provides an overview of the various philosophies adapted from Fleetwood (2013). The table addresses the dearth of literature on theories underlying the social context within the domain of information systems, and opens up interesting avenues for the study of social elements in EA.

Fleetwood's table demonstrates the tripartite connections between ontology, methodology and practical theory, which is pivotal within the explanatory context of this study. As explained by Archer (1995, p. 5) "...some social theorists have returned to work exclusively on the reconceptualization of social reality. As such they may be playing a useful role in the division of sociological labour, but if they suggest that their ontological exertions suffice, the theoretical enterprise simply cannot be resumed on this unfinished basis. The practical analyst of society needs to know not only what social reality is, but also how to begin to explain it, before addressing the particular problem under investigation. In short, methodology, broadly conceived of as an explanatory programme, is the necessary link between social ontology and practical theory."

Table 4.1 Various scope of the philosophy of science and meta-theory (adapted form Fleetwood, 2013, p. 11)

	Empirical realist ontology: Entities are observed, atomistic events	Idealist ontology: Entities are constituted entirely by discourse	Critical realist ontology Entities are stratified, emergent, transformational + relational & processual
Associated meta-theory	Positivism or 'scientism'	Various	Critical realism
Ontology	Atomistic, observable, events No recognition of social construction No agency-structure approach, only rational agents as individuals	Entities cannot exist independently of their identification because all entities are constructed from discourse (etc.). 'Reality' is entirely socially constructed. 'Reality' is problematized, doubted & sometimes denied. 'Reality' is multiple. 'Reality' is becoming & processual. Agents: decentred subjects constructed via discourse. No agency-structure approach	Some entities exist independently of their identification because not all are constructed from discourse – i.e. extra-discursive Single reality but multiple interpretations. Four modes of reality; materially, artefactually, ideally & socially (essentially builds on the three domains, see Figure 4.1): Reality is stratified, emergent, transformational, systemically open, becoming, processual & often relational (see section 4.3.1) Agents & structures: distinct but related: TMSA – Morphogenetic Approach
Scope of philosophy & meta-theory	Avoids virtually all discussion of meta-theory Gets on with applying its method and 'doing' O&M science	Replaces philosophy of science with socio-politics of science. Offers a socio-political critique of meta-theory. As yet little engagement with CR.	Explicitly reflects upon meta-theory. Engages with the other ontologies. Accepts socio-political critique of meta-theory. Retains both philosophy of science & socio-politics of science
Epistemology	Knowledge derives from (a) observing (b) event regularities. Truth established via testing hypotheses. Not relativist at all.	Primacy of epistemology over ontology Fudges or denies ontology-epistemology divide. Recognises the fragility of knowledge – for ontological reasons. 'Truth' (with capital 'T') is impossible for ontological reasons: it is socially constructed. Pragmatic notion of 'truth'. Epistemically & judgementslly relativist.	Subordination of epistemology to ontology. Recognises the fragility of knowledge - for epistemological reasons. Knowledge derives from uncovering causal mechanisms. Truth (not with capital 'T') is difficult but not impossible. Epistemically but not judgementslly relativist.
Aetiology	Humean: causality as event regularity. Laws, law-like relations & functional relations.	Reduces causality to Humean causality, rejects the latter, thereby rejecting the notion of causality.	Separates Humean causality from causality as powers & tendencies. Powers & tendencies replace laws, law-like & functional relations
Methodology	Covering law method. Explanation = prediction Laws or event regularities = closed systems.	Mainly deconstruction, genealogy, but other methods used.	Causal-explanatory. Explanation via uncovering & understanding causal mechanisms Deconstruction & genealogy accepted.
Research technique	Maths, stats & quantitative data. Regression, analysis of variance, correlation, structural equation modelling, factor analysis	Permissive. Avoids quantitative analysis.	Permissive Critical discourse analysis, action research, archaeology Mainly uses qualitative techniques: role of (some) quantitative techniques is debated.
Objective	Prediction. To construct & test predictions & hypotheses to establish whether claims are true or false.	Socio-political not meta-theoretical. Attempts to uncover power-knowledge & socio-political agendas & lend voice to relatively powerless.	Explanation. Accepts attempts to uncover power-knowledge & socio-political agendas & lend voice to relatively powerless.
Explanation	Explanation is 'thin'. Explanation = prediction.	What is to be explained shifts from entity to its social construction. To explain is to provide a socio-political account of how 'reality' is socially constructed.	Explanation is 'thick' - operation of causal mechanisms Not confused with prediction. Accepts a role for socio-political account.
Prediction	Prediction confused with explanation. Explanation based on inductive generalisations. Spurious precision.	Rejected as a naïve idea sought by positivists who accept the modernist idea that we can predict & control 'reality'.	Tendential prediction based on knowledge of causal mechanisms. Tendential prediction is not precise, but not spurious either.
Theory	Vehicle for delivering predictions	Unclear. Sceptical of the very idea of theory.	Vehicle for delivering causal-explanatory accounts.
Mode	Deduction & induction	Unclear	Abduction & retroduction

4.3 Morphogenetic Approach: A Social Investigation in Social Mechanisms

In adopting CR, a number of philosophical assumptions must be met. One of the most important is the analytical separation of structure and agency over time. Termed “analytical dualism” by Archer (1989), this is a fundamental component of the critical realist approach. The aim of analytical dualism is to enable examination of the complex duality of structure and agency, an artificial separation or dualism, and investigate the complex duality between structures (macro) and agents (micro). It suggests:

- a) Structure necessarily pre-dates the action(s) leading to its reproduction or transformation; and
- b) Structural elaboration necessarily post-dates the action sequences which gave rise to it (Archer, 1995, p. 15).

The morphogenetic approach, also referred to as Morphogenetic/Morphostatic (M/M) (Archer, 2015) is a meta-theoretical social ontology developed by Archer (1979; 1989; 1995; 2013a) as a methodological complement to CR by applying an analytical dualism over time. Morphogenesis “refers to the complex interchanges that produce change in a system's given form, structure or state (‘Morphostatis’ is the reverse)” (Archer 1989, p. xxii). MA analysis takes place in three cycles: a) structural conditioning, which refers to pre-existing structures that condition but do not determine; b) social interaction, which arises from actions oriented towards the realisation of interests and needs emanating from current agents and may lead to c) structural elaboration or modification, that is, a change in the relations between parts of the social system.

Archer (1995, p. 195) suggested people are capable of resisting, repudiating, suspending or circumventing not only the structural tendency, but also the cultural tendency in unpredictable ways because of their creative powers as human beings in producing tendencies towards change/elaboration (or reproduction) in the relational organisation of the social order. These processes of change (or reproduction) are conceived as “generative mechanisms” (Archer, 2015). To elaborate, Archer (1995, p. 175) described it thus:

...morphogenetic approach makes no leap from the real to the actual, but rather dwells on the ground between them by analysing the generative mechanisms potentially emanating from structures (and cultures) as emergent properties and their reception by people, with their own emergent powers of self and social reflection. Outcomes never simply mirror one or the other, but are the products of their interplay.” Hence, “In society there are a variety of emergent properties – structural, cultural and agential, each of which is irreducible to the others, has relative autonomy, and is also relatively enduring.

4.3.1 The emergent properties: Structural – cultural formation, and agency influence

Structure, culture and agency^{3.1} are viewed by Archer as analytically distinct strata of social reality in which social structures are viewed as “...relatively enduring, anterior social objects that possess causal powers and are neither observable nor reducible to social interaction” (Luckett, 2012, p. 340). Archer (1995) portrayed the social world as a stratified model involving: a) different structural emergent properties (SEPs): roles, institutional structures, social systems and positions; b) different cultural emergent properties (CEPs): ideas, theories, beliefs, values and ideologies; and c) different people emergent properties (PEPs): dependent on a stratified model of human beings, agents, and actors.

Archer (1995) expressed the opinion that:

Structures (as emergent entities) are not only irreducible to people, they pre-exist them, and people are not puppets of structures because they have their own emergent properties which mean they either reproduce or transform social structure, rather than creating it. To explain which occurs the realist examines the interplay between the two (endorsing and utilizing separability) and in both cases, reproduction and transformation necessarily refer to maintaining or changing something which is temporally prior to these activities (p. 71).

Box 3.1: Structure, Culture, and Agency

Structure is a relational property that has the generative capacity to modify the powers of its objects and to exercise causal influences (Radulescu & Vessey, 2008, p. 9). Structures (at any given time) are the results of human interaction, including the results of the results of that interaction - any of which may be unintended, unwanted and unacknowledged (Archer, 1995, p. 196).

Culture is the product of human agency (Archer, 1996, p. 77), and presented as a resource which agents draw upon within action contexts but is never something which shapes these contexts for them. (Archer, 1996, p. 304).

Agency is used as a generic term which stands for the 'people' which constitute the 'parts' of society. Agency stands as the middle element linking Persons → Agents → Actors and is needed to account for who occupies which roles - and why they do what they do when the role does not require them to do it: the genealogy, Human Being-Agent-Actor (Archer, 1995, p. 256).

Archer also argued that culture is approached analytically in exactly the same way as structure:

Like structure, culture is a human product but it too escapes its makers to act back upon them. The CS [cultural system] contains constraints (like the things that can and cannot be said in a particular natural language), it embodies new possibilities (such as technical applications undreamed of in the pure theory on which they are based), and it introduces new problems through the relationships between the emergent entities themselves (the clash of theories), between these and the physical environment (mastery or ruin), and between these and human agents (makers and openers of Pandora's box). Consequently, as CEPs, ideational contradictions exist independently of people noticing them or caring about them — indeed since there are an infinite number of situations upon which any theory may bear, it might well contain contradictions of which no one is aware. Similarly, the

relationship between a problem and a solution, which is one of compatibility, is ultimately divorced from whether anyone does understand it, though not from the ability of someone to do so. Thus, as a CEP, a soufflé recipe might not have been used by anyone living, but would still work for the cook who eventually tried it (1995, p. 181).

Archer suggested the emergent properties of collectivities and individuals differ from the emergent properties of organised groups, which differ yet again from those pertaining to populations (p. 190). Yet, as detailed in Figure 4.2 “these different levels of ‘social integration’ are not discrete from the powers of ‘system integration’, despite their capacity for independent variation at any given time” (p. 190). Archer described a double morphogenesis:

...where agency undergoes transformation, acquiring new emergent powers in the very process of seeking to reproduce and transform structures. For in such structural and cultural struggles, consciousness is raised as collectivities are transformed from primary agents into promotive interest groups; social selves are re-constituted as actors personify roles in particular ways to further their self-defined ends; and corporate agency is re-defined as institutional interests promote reorganization and re-articulation of goals in the course of strategic action for their promotion or defence (p. 190-191).

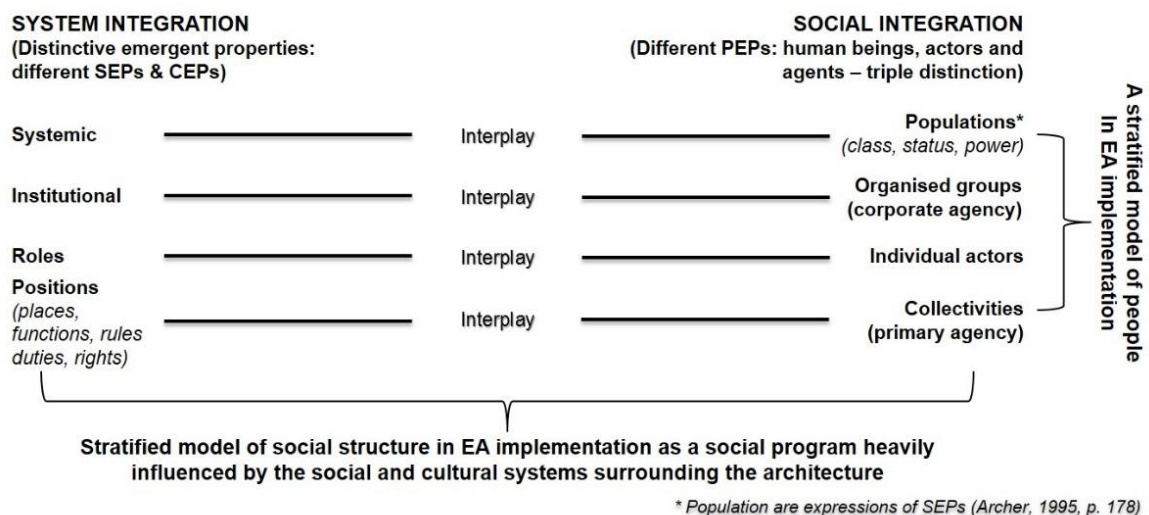


Figure 4.2: Analytical dualism in social theory: A stratified model of social structure involving SEPs, CEPs and PEPs in EA implementation (adapted from Archer, 1995, p. 190)

This stratification of agents described on the right-hand side of Figure 4.2 allows a rich representation of people's roles in organisational change as they can be seen as primary agents in particular positions, corporate agents in institutions, or as individual actors in particular roles. Structural influences (the generative powers of SEPs and CEPs) are mediated towards people through shaping the situations in which they find themselves.

Archer's stratified model of people in Figure 4.2 (the different emergent properties of people) suggests that: a) primary agents are collectivities of people who share the same position (places, functions, rules, duties and rights); b) individual actors are those who fill particular social roles that further their self-defined ends; and c) corporate agents are organised groups who institutionally play the major part in institutional decision-making. Archer (1995) explained:

For in such structural and cultural struggles, consciousness is raised as collectivities are transformed from primary agents into promotive interest groups; social selves are re constituted as actors personify roles in particular ways to further their self-defined ends; and corporate agency is re-defined as institutional interests promote reorganization and re articulation of goals in the course of strategic action for their promotion or defence. All the above processes are reinforced or repressed by the overall state of systemic integration, whose incompatibilities foster their actualization and whose coherence serves to contain this transformative potential of agency (p. 191).

In short, MA deals with emergent properties in the analyses of structure, culture and agency as an attempt to bridge the gap between the explanatory power of the practical social theory and the ontological strength of the realist philosophy. MA analysis therefore works in three part cycles; each has relative autonomy yet interacts with the others (Archer, 1995). As described by Lockett (2012, pp. 341–342): at Time 1 [T1] the "...structural and cultural conditioning is already set up, before human actors with particular intentions, concerns and projects located in particular roles and positions in institutions begin interacting with each other at Time 2 – Time 3 [T2 – T3] (social and socio-cultural interaction). It is here, at the second stage of the morphogenetic cycle that human agency, in the form of personal emergent properties (PEPs) is exercised. Some institutional roles are necessarily related to

each other [...], whilst others are contingent to the context. Exactly what emerges from a particular period of social/socio-cultural interaction (Time 2 – Time 3) is contingent on the context of [the] situation and cannot be predicted.” Thus, the realisation of interests and needs emanating from current agents may lead to structural and cultural elaboration (morphogenesis) or reproduction (morphostasis) at Time 4 [T4]. The overall MA diagrammatic analyses are shown in Figures 4.3 – 4.5.

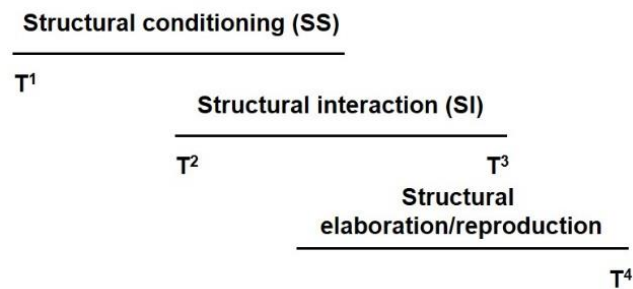


Figure 4.3: The morphogenetic/static of structure (adapted from Archer, 1995, p. 193)

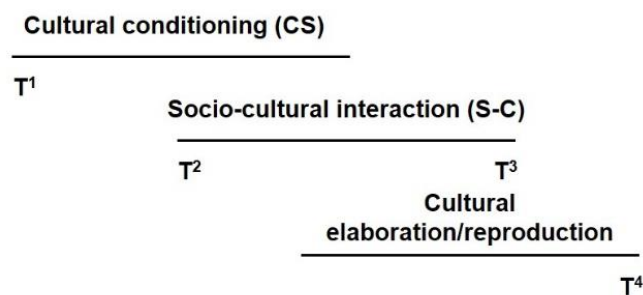


Figure 4.4: The morphogenetic/static of culture (adapted from Archer, 1995, p. 193)

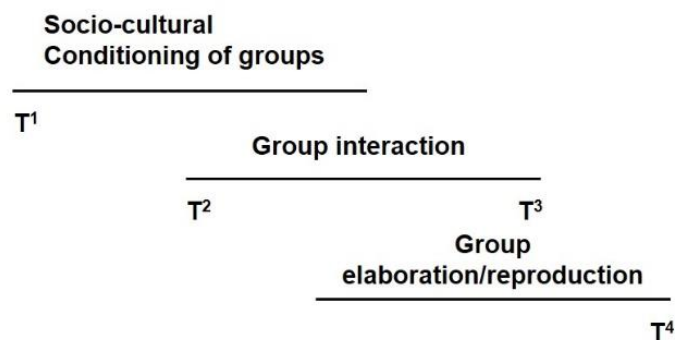


Figure 4.5: The morphogenetic/static of agency (adapted from Archer, 1995, p. 194)

In review, the practical application of morphogenetic/morphostatic analysis of structure requires a social system with four basic propositions (Archer, 1995, pp. 168-169):

- a) There are internal and necessary relations within and between Social Structures (SS);
- b) Causal influences are exerted by Social Structure(s) (SS) on Social Interaction (SI);
- c) There are causal relationships between groups and individuals at the level of Social Interaction (SI);
- d) Social Interaction (SI) elaborates upon the composition of Social Structure(s) (SS) by modifying current internal and necessary structural relationships and introducing new ones where morphogenesis is concerned. Alternatively, Social Interaction (SI) reproduces existing internal and necessary structural relations when morphostasis applies.

In the same way, culture also presupposes a social system with four basic propositions (Archer, 1995, p. 169):

- a) There are internal and necessary logical relationships between components of the Cultural System (CS);
- b) Causal influences are exerted by the Cultural System (CS) on Socio-Cultural interaction (the S-C level);
- c) There are causal relationships between groups and individuals at the Socio- Cultural (S-C) level;
- d) There is elaboration of the Cultural System (CS) due to Socio-Cultural Interaction (S-C) modifying current logical relationships and introducing new ones, where morphogenesis is concerned. Alternatively, Socio-Cultural Interaction (S-C) reproduces existing internal and necessary cultural relations when morphostasis applies.

To summarise, the context of interpretation of the cultural levels (CS and S-C) in MA is supported by sociologically sound methodology. Archer has made a clear argument about the distinction between the Cultural System and Socio-Cultural level within the morphogenetic/morphostatic agency, claiming that: "...if we clearly distinguish between the two cultural levels, the Systemic and the Socio-Cultural, then we can also differentiate

between the aspects of context - 'other ideas' and 'other people' - on which the former and latter depend respectively (1996, p. 134).” This implies that in a cultural context of agency, the logical and the causal are systematically separated. As detailed in Table 4.2 below, Archer observes that the MA separates the macroscopic cultural interactions or textual ideas (CS) from people's meanings (S-C) and that this turns out to be of value to explain the micro-concerns of those whose first reaction was to flinch away from such textual definition (1996, p. 136).

Table 4.2 The Cultural system and socio-cultural level within the morphogenetic/static view of agency (adapted from Archer, 1996, p. 134)

Cultural level	Context dependent on	Relation between them
Cultural system (CS)	Other ideas	Logical: Logical relationships between component of CS
Socio-cultural (S-C)	Other people	Causal: Causal influences are exerted by the Cultural System (CS) on Socio-Cultural interaction (the S-C level); Causal relationships between groups and individuals at the Socio-Cultural (S-C) level;
Morphogenesis:	The S-C level elaborates on the composition of the CS by modifying current logical relationships and introducing new ones	
Morphostatis:	S-C reproduces existing internal and necessary cultural relations	

Nevertheless, Archer’s micro-concerns about agency still had a central dilemma, particularly from a CR perspective. According to the author “CR cannot be charged with smallism. It has been committed to strong emergence and ontological stratification since its inception (2015, p. 35).” By smallism Archer describes the tendency to privilege the small over the large in scientific discourse (for example methodological individualism). Archer concluded it is possible for MA to work in a macro-micro-macro context of the social world:

...it [CR] has not entirely freed itself of the smallest prejudice. For example, the recurring trope of “underlying mechanisms” carries the unfortunate

connotation that mechanisms operate at the micro-scale. There is, as well, a small remnant of causal deflation. The MM approach [morphogenetic approach – MA] does draw a clear distinction between “macro” and “micro” causation, to be sure. But macro-to-micro causation is often represented in terms of efficient causation: structure at T1 impacts agency at T2. No doubt! But not only. Structure also influences agency synchronically by constraining and enabling certain agentic powers. What is needed, then, is: (1) an understanding of social mechanisms that is fully shorn of the mechanistic metaphysics of the physicalist imaginary; and (2) an understanding of social causation that is more attentive to: (a) different forms of social causation; and (b) specific types of causal powers in the social world (2015, p. 35).

In this EA examination, it can be seen that an explanation (not prediction) of generative mechanisms, and their interplay between structural, cultural and people (agency), becomes the objective of the study. As a complementary methodology, MA is ‘causal-explanatory’ (Fleetwood, 2013), whereby “explanatory” refers to its objective to explain, and “causal” because it explains in terms of providing a causal account. Hence, if an explanation of people-focused mechanisms and their interplay between and within the structure, the culture, and the agency (people) was found, then this study would have presented a theoretical explanation of the role of people as a key element in EA implementation. Figure 4.6 illustrates the use of MA in identifying the hidden generative mechanisms within social contexts, and their interplay between structure, culture and people (agency) in EA implementation programs.

In Figure 4.6 people (agents) can be seen to be acting purposefully through conscious and unconscious interaction, thereby reproducing or transforming the structures and cultures that enable and constrain their actions. Structures and cultures are the ever-present conditions and the continually altered or sustained outcomes of human agency (adapted from Fleetwood, 2013). This causal-explanatory framework of MA directed this study towards developing the research questions and consequently formulating the interview questions (see Chapter 5).

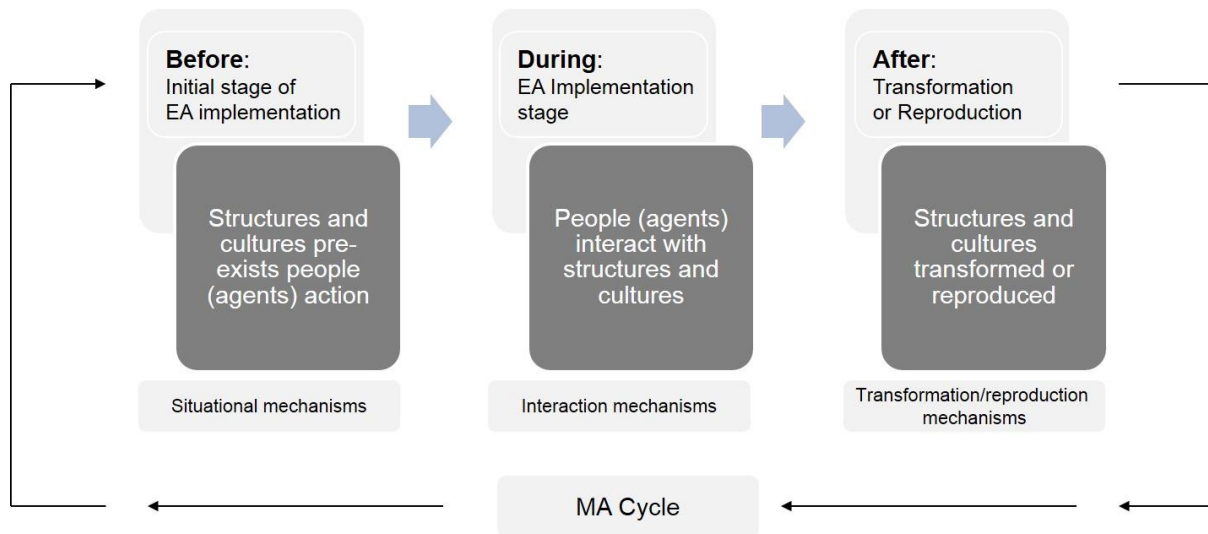


Figure 4.6: Morphogenetic approach in explanatory study (adapted from *Fleetwood, 2013*)

4.3.2 Situational logics and enterprise architecture pathways

In understanding the structural and cultural conditions from the viewpoint of agency, Archer considered situations are:

...shaped very differently for agents according to whether such emergent properties are characterized by tensions between their component elements or by coherence between them (1995, p. 214).

According to Archer (1995) emergent properties (see Figure 4.9) have two roles: a) the role of first-order emergent properties (that is, the results of past interaction); and b) the role of second-order emergent properties (that is, the relations between the results of the results of past actions/first-order emergent properties). First-order emergent properties is the shape of past distributions: systemic, institutional, roles, and positions that play in the strategic directional guidance of an organisation at the (macro) institutional level and affects large segments of the population. In this study the two roles of emergent properties were understood to determine: a) the relationship between a time prior to EA implementation and at the time of EA implementation (the first- and second-order emergent properties); and b) the situational logics of the interplay between and within structure, culture and agency at the time of EA implementation (second-order emergent properties).

Archer (1988, 1995) argued that, at institutional level, interactions between emergent structural and cultural properties create different modes of conditioning and interaction in situational logics, which predispose agents to follow particular courses of action to promote their important personal projects (that is, in the second-order emergent properties). Archer also concluded there may be consistency or contradiction between ideas within the cultural system. Consistency and contradiction can be necessary (internally related as the ideas depend on each other and cannot operate apart) or contingent (externally related and contextual). Figure 4.7 describes Archer's causal influences exerted by the cultural system on the socio-cultural and defines four possible interactions between the cultural (A) and the structural (B) systems (Archer 1995; 1996):

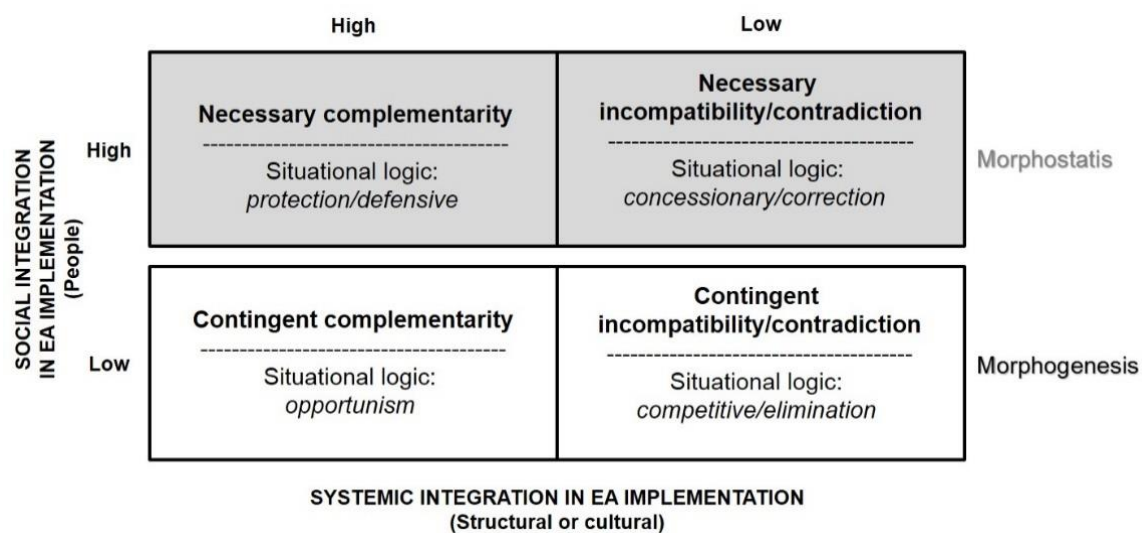


Figure 4.7: Morphostatis vs morphogenesis: Situational logics in social and system integration in EA implementation (adapted from Archer, 1995, pp. 218 and 295)

1. **Necessary complementarities** – The ideational compatibilities between A and B lead to an environment of mutual support. “In other words, invoking A also ineluctably evokes B, but since the B upon which this A depends is consistent with it, then B buttresses adherence to A.” (p. 234). The structural and the ideational are in harmony, and such a position has causal possibilities at a structural level, creating a situational logic of protection at the systems level. Archer suggests that increasing the depth of systemization at the structural level increasingly blocks change because of its threat of disruption. At the personal level, corporate agents see the increasing barrier to their

advancement and may thus seek unpredictable avenues to break out of the constraining systemic limitations.

2. **Necessary incompatibilities** – These are the reverse of necessary complementarities; components of the socio-cultural system that contain some particular belief or theory which is internally inconsistent with ideas at the cultural level. “When the constitution of the social system is marked by incompatibilities between institutions which are none the less internally and necessarily related, this has rightly been seen as containing a potential for change which is entirely lacking in the complementary configurations. Generally, when two or more institutions are necessarily and internally related to one another yet the effects of their operations are to threaten the endurance of the relationship itself, this has been referred to as a state of 'contradiction'" (p. 222). Such incompatibility, or contradiction, provides a situational logic of correction as these ideas must ultimately accommodate each other. At the structural level the need for accommodation suggests the emergence of properties directed by compromise as parties struggle to remain in power. Unification is a consequence at the socio-cultural level as compromise becomes essential and emergent. This holding state is inherently unstable and suggests a period of instability as participants' jockey for position with accommodation as the focus, seeking to survive amongst the incompatible cultural ideas.
3. **Contingent incompatibilities** – Occur when the material world produces situations which are incompatible with the prevailing social and cultural properties “because partisans of A and B are unconstrained by any dependence between these items, there is nothing which restrains their combativeness for they have everything to gain from inflicting maximum damage on one another's ideas in the course of competition” (Archer, 1988, p. 240). A “battleground of ideas” emerges providing a situational logic of elimination; the pluralism at a cultural level promotes the creation of distinct loyalties at a socio-cultural level – such cleavage encouraging competition at a structural level and polarization at a social level as groups and individuals struggle to remain in the game. Cooperation on the acceptance of change is discouraged and diversity reduced as elimination of alternatives is attempted and progressed.

4. **Contingent complementarities** – Occur when material opportunities arise that resonate with the social and cultural properties, stimulating opportunism - “Only the contingent complementarity simultaneously holds out choices to the adherents of A but leaves them free to make what they will (if anything) of B...only the contingent compatibility is free from sociocultural manipulation, designed to induce avoidance or adoption or aversion. Certainly, distracting sociocultural practices – habitual preoccupations, established routines, traditional preserves or conventional divisions of subjects – may well reduce subjective willingness to explore new and congruent possibilities, but these will usually coexist with various sticks and carrots which stimulate originality, innovation and experimentation (as in the derived sequence). The actors concerned have substantial freedom to survey or to ignore the broader horizon which has come in to view...” (Archer 1988, p. 243). The situational logic of opportunism has a net systemic result of great cultural variety. It “breaks down artificial knowledge barriers, stimulates new departures and bold syntheses”. At the cultural level wild ideas and daring proposals can ensue unchecked by the socio-cultural. At the socio-cultural diversification, specialization and recombination can ensue as “marginals disengage themselves to reconstitute in a group with a novel brief” (p. 244).

MA can be applied at lower levels than those proposed by Archer (2013a). In the university environment (for example Lockett, 2012), it allows examination of the roles of the different centres within the overall university system. At this level one could argue that the internal operation of the sandstone (traditional) universities can be framed as an environment of contingent incompatibilities over the initial period of EA implementation, in that the cultural requirement of academic freedom conflicts with a systemic need for increased managerialism and greater control, with EA implementation providing the battleground for such contradictions by reflecting the university’s requirement for greater control and IT centralisation.

Seeking to evangelise the corporate commitment to control, impinges on the centres’ desire for freedom to do what they wish. As detailed in Figure 4.8, the situational logic of correction suggests an outcome at the cultural ideational level of syncretism (the attempt to sink differences and effect union between the contradictory elements concerned) (p. 233). This situational logic must lead to compromise at a systemic level, as one or both parties lead to a

re-definition of the EA to accommodate the irreconcilable ideational differences. The main thrust of this situational logic is the “sinking of differences”, a unification and compromise. Archer does not include time in her detailed figure, but it is implicit in the development of the argument in her seminal book, *Realist Social Theory: The Morphogenetic Approach*. Figure 4.8 illustrates the situational logics of both structural competition and cultural opportunity, thus redefining the relation between cultures and structures in EA implementation.

		The role of emergent properties: Second-order emergent				
		Contradictions		Complementarities		
		Necessary	Contingent	Necessary	Contingent	
		correction	elimination	protection	opportunism	
Morphogenetic/static cycle	Time	Situational logic				
	T1	CEP's: Different modes of conditioning at Cultural system (CS)	syncretism	pluralism	systematization	specialization
		SEP's: Different modes of conditioning at Structural system (SS)	compromise	competition	integration	differentiation
	T2-T3	CEP's: Different modes of interaction at Socio-cultural interaction (S-C)	unification	cleavage	reproduction	sectionalism
		SEP's: Different modes of interaction at Social interaction (SI)	containment	polarisation	solidarity	diversification
	T4	Structural and cultural elaboration or reproduction	Morphostatis	Morphogenesis	Morphostatis	Morphogenesis

Figure 4.8: Situational Logics at different strata (adapted from Archer, 1995 p. 303)

A state of contradiction would hopefully be short-lived as the benefits achievable through compromise become clear to the parties upon whom change is being imposed. An alternative pathway for contingent incompatibilities may ensue when parties deem unification impossible and unnecessary. Under this situational logic a battle will rage as logic moves towards elimination, and accepting the divergence at a cultural level in turn leads to cleavage at the socio-cultural level and competition at a systemic level. While the battle rages, centres will seek advantage, power and politics playing a crucial and important role. Cleavage is not a desirable option given the immediate threats evident within the university environment and cannot be allowed to prevail, as universities do not have the luxury of time due to the urgency of external forces.

Yet as Archer suggests, the acceptance or otherwise of these logics depend on their ultimate social reception. Primary agents are defined by Archer as “collectivities sharing the same life chances”, in other words everyone is inescapably an agent in some of their doings by being part of a collective, intentionally or otherwise. Archer distinguishes thus between corporate

agents and primary agents: primary agents are those who have no say in possible cultural or systemic re-modelling. They “neither express interests nor organize for their strategic pursuit” (p. 259). This is not to say that the aggregated effects of primary agents can have no impact at a cultural or systemic level; they can well generate aggregated and powerful impacts at a systemic level, but the outcomes are a consequence of uncoordinated action and without stated aim.

Social interaction in programs like EA implementation plays out in an environment of corporate agents promoting the systemic state in question. Corporate agency thus shapes the context for primary agency. Yet primary agency also has aggregate effects, as it unleashes a range of environmental pressures and problems which may impact the aims the corporate agent seeks. This is what Archer referred to as double morphogenesis, “...where agency undergoes transformation, acquiring new emergent powers in the very process of seeking to reproduce and transform structures” (p. 190). Corporate agency thus has two tasks with respect to the promotion of their goals: “the pursuit of its self-declared goals as defined in a prior social context; and their continued pursuit in an environment modified by the responses of primary agency to the context which they confront” (p. 260).

The acceptance of EA is ultimately dependent on primary agents’ acceptance of its basic premise given the context within which they reside. Horrocks (2009) suggested the recognition of a distinction between corporate and primary agents is useful in examining program implementation. There are many cases where agents are ambivalent to EA and its underlying premise, yet their aggregate effects may well be significant to its ultimate rejection or acceptance. Those with little understanding of IT and its strategic role will need to be convinced of the ultimate benefits of restrictions to their current ways of doing things. Presenting EA to such a group is a challenge. The program mechanisms must place a major focus on communication of the benefits in context, clearly recognising the cultural and ideational elements involved.

Figure 4.9 illustrates the causal explanation between the first- and second-order emergent properties; the different modes of conditioning and interaction in situational logics; and the MA outcomes. As an explanatory framework in the examination of people’s role and the social aspects of EA implementation, MA assists in providing analytical histories of emergence that

can uncover the interplay between and within social structures, socio-cultural systems and agency (the analytical dualism). Archer (1995) explained:

...the kind of explanation which the morphogenetic approach proffers takes the form of analytical histories of emergence for the practical issue under investigation. It does so by examining the interplay within and between the three cycles, for the ultimate benefit of analytical dualism is that it is not a static method of differentiation but a tool for examining the dynamics by which the 'parts' and the 'people' shape and re-shape one another through their reciprocal interaction over time (p. 194).

The explanatory format consists in providing analytical histories of emergence. At every level the tendential powers of generative mechanisms are complemented and supplemented by a historical analysis of the concrete contingencies which intervened to produce particular outcomes. The format itself is none other than the three-phase morphogenetic/static cycle, with the phases delineated according to the problems in hand. The three parts of the analytical narrative consist of 'structural conditioning' by the prior distribution of resources, of life chances, of vested interests and of bargaining power which are mediated to agents situationally; 'social interaction' as conditioned by the former, by other structural factors which also impinge on agents, by social affinities and antagonisms between them, and ultimately by the reflexive monitoring of an inalienably innovative agency; 'structural elaboration' is quintessentially dependent upon how (or whether), in the precise combination of conditioning and contingency, bargaining power is converted into negotiating strength between corporate agents. But neither combination nor conversion are mechanical processes compelling or propelling agents: on the contrary they are the situated products of self-conscious agents which is what makes their strategic use of power and exchange that which actually mediates elaboration (p. 327).

Analytical histories represent agency with different modes of conditioning and interaction in situational logics for their attainment (see Figure 4.8); the connective generative mechanisms between structural and cultural conditioning (T1) and structural and socio-cultural interaction (T2-T3), which constitutes the possible transformation or reproduction mechanisms at structural/cultural elaboration or reproduction (T4). These mechanisms are complemented and supplemented by the historical analysis of the concrete contingencies of the structural and cultural conditioning, the structural and socio-cultural interaction, and the structural and cultural elaboration (morphogenesis) or the structural and cultural reproduction (morphostatis). Either of morphogenesis or morphostatis will generate the key implementation mechanisms as the results of MA outcomes.

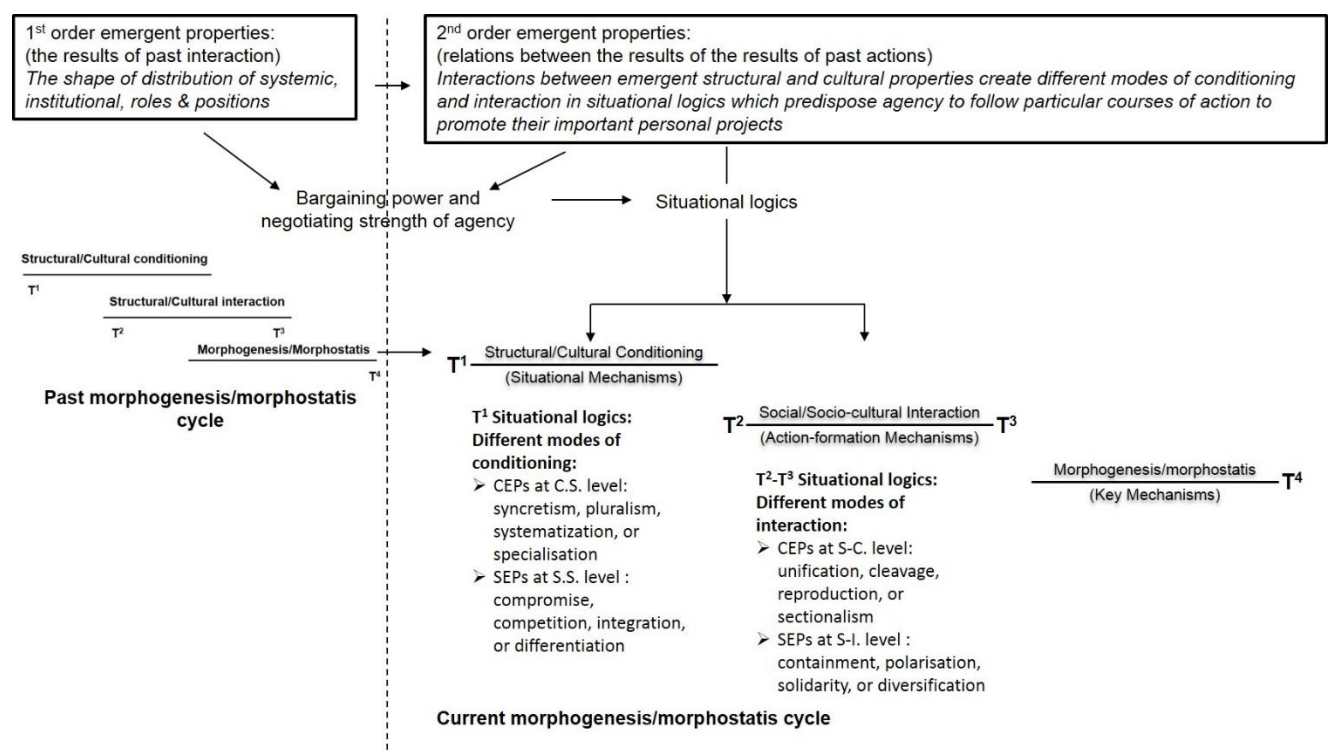


Figure 4.9: The analytical histories of emergence: Relationship between first- and second order emergent properties, generative mechanisms, and MA outcomes (adapted from Archer, 1995; Horrocks, 2009)

4.3.3 Possible contextual social mechanisms identified from the literature review

A review of the current literature highlighted the importance of possible social mechanisms for EA implementation programs, and affirmed Archer's MA as the most critical in defining situational and interactive social mechanism by making clear the situational logics proposed by Archer (1995). Archer (2015, p. 171) emphasised that:

...one always has to take the structural conditioning and the related situational logic into account – the particular resources actors can count on, and the reflexive agency, individual and social, acting upon the given situation. No real 'situation' exists without these factors...

Although Archer never identified the different modes of situational logics as generative mechanisms, based on the present theoretical context in the literature, this study assumes that these different modes (see Figures 4.8 and 4.9) have definite relations to the "generative complexes" because they can explain: (a) such associations (i.e. how they arose and work) and (b) are robust enough to account for cases and times when no such 'constant conjuncture' can be found (i.e. Y is not significantly correlated with Z) but do not entail scrapping the mechanism itself since tendencies may be possessed yet unexercised, exercised yet unrealised, and realised yet unperceived (or undetected) (Archer, 2015, p. 2). To conclude, it is logical to assume that Archer's generative mechanisms fit into a broader view of the aims and standards of critical realist explanatory approaches, and more importantly, supplies a valid basis for causal explanation.

Table 4.3 is derived from Figure 4.8 and provides an overview of the possible social mechanisms suggested by Archer. It forms the basis for identifying key implementation mechanisms and social responses triggered by the EA implementation.

All the possible mechanisms identified in the literature (program mechanisms in Chapter 2 and social mechanisms in Chapter 4) provide different explanations for implementation. They provided the basis for examining specific key implementation mechanisms to which people responded in the new EA program, as provided by the process and technology.

Table 4.3 Possible social mechanisms identified in the literature

Situational Logic	Social component Level Generative mechanism	Cultural systems	Structural system	Socio-cultural interaction	Social interaction	Tendency Power		Literature
						Morphostatis	Morphogenesis	
Syncretism	Situational mechanism							Archer (1995; 1996)
Compromise	Situational mechanism							Archer (1995)
Unification	Interaction mechanism							Archer (1995; 1996)
Containment	Interaction mechanism							Archer (1995)
Correction	Reproduction mechanism							Archer (1995; 1996)
Pluralism	Situational mechanism							Archer (1995; 1996)
Competition	Situational mechanism							Archer (1995)
Cleavage	Interaction mechanism							Archer (1995; 1996)
Polarisation	Interaction mechanism							Archer (1995)
Elimination	Transformation mechanism							Archer (1995; 1996)
Systematization	Situational mechanism							Archer (1995; 1996)
Integration	Situational mechanism							Archer (1995)
Reproduction	Interaction mechanism							Archer (1995; 1996)
Solidarity	Interaction mechanism							Archer (1995)
Protection	Reproduction mechanism							Archer (1995; 1996)
Specialization	Situational mechanism							Archer (1995; 1996)
Differentiation	Situational mechanism							Archer (1995)
Sectionalism	Interaction mechanism							Archer (1995; 1996)
Diversification	Interaction mechanism							Archer (1995)
Opportunism	Transformation mechanism							Archer (1995; 1996)

4.4 A Central Role for Reflexivity in the Implementation Program

Although MA is advantageous for examining the complex duality of social structure (macro) and agency (micro), it does not answer how social structure (and culture) and agency are linked. Archer (2008) suggested:

...agents' use of their reflexivity constitutes the missing and mediating link." Thus, "Through their reflexive deliberations ('internal conversations') agents subjectively define particular courses of action ('projects') in relation to their objective social circumstances ('contexts'). Without this, we have no explanatory purchase upon exactly what agents do because in the same circumstances they do not act in uniform ways. Conversely, a proper grasp of reflexive deliberations accounts for subjects' evaluations of their situations in the light of their personal concerns, and their (re-) evaluation of their projects in the light of their situations. Without such an account, sociology has to settle for empirical generalizations about what 'most people do most of the time' (Archer, 2008, p. 1).

In examining the role of agency (people) and its interplay with structures and cultures in EA implementation, it is necessary to examine the mechanisms or causalities that determine the state of interplay. As mechanisms are only effective if people adopt them reflexively, this study used reflexivity to explain how people responded to the embedded mechanisms of EA implementation. Archer (2007, p. 4) described reflexivity as:

...the regular exercise of the mental ability, shared by all normal people, to consider themselves in relation to their (social) contexts and vice versa. Such deliberations are important since they form the basis upon which people determine their future courses of action—always fallibly and always under their own descriptions.

In other words, reflexivity refers to people's thoughts and ideas that tend to consider themselves (the personal concern: 'concern') in relation to their social situation (the social situational: 'contexts') in determining their future courses of action. People's thoughts and ideas tend to be inherently biased and bidirectional, with both cause and effect influencing one another's actions – i.e. there is a circular relationship between cause and effect.

Archer (2010b) expressed the opinion that reflexivity is not a 'routinized action' and people do cope with change through conscious or unconscious decision-making (p. 7). Thus "...[reflexivity] is the process through which reasons become causes of the courses of action adopted by social subjects. Their subjective internal deliberations – internal conversations –

are responsible for mediating the conditional influence of objective structural and cultural factors upon social action... (p. 5)". Reflexivity is held to be a prerequisite for all forms of social life (Archer, 2010b, p. 8) and reflexive deliberations form an important "mechanism" for explaining how structures constrain and enable agents.

There are two essential components of reflexivity that need to be considered and understood in this study. First are the personal (individual) reflexivity styles to explain different individual responses to the situations people find themselves in; and second is the collective reflexivity which also reflects the people role in EA implementation. Archer (1995) suggested that only corporate agents have morphogenetic possibilities, and their power to change is only achieved via their involvement in some collective. A collective concern for the role of people in EA implementation entails reflexive deliberation about collective responses to situations where a common focus in EA implementation is shared through intrinsic commitment. This communal experience provides a new way of building commitment for the successful implementation of EA.

Archer (2007) suggested individual reflexivity is particularly important in understanding the role played by individuals in responding to change proposals. Individual motives and properties are necessary for understanding the mechanisms by which structures impact agents and the following need to be considered:

(1) Why do people act at all? What motivates them and what are they (fallibly) trying to achieve by endorsing given courses of action? This entails an examination of their personal concerns and inner reflexive deliberations about how to go about realizing them. (2) How do social properties influence the courses of action that people adopt? This involves a specification of how objective structural or cultural powers are reflexively mediated. (3) What exactly do people do? This requires an examination of the variability in the actions of those similarly socially situated and the differences in their processes of reflexivity (Archer 2007, p. 6).

To determine the collective reflexivity Archer (2010b; 2013b) recommended looking at the four primary modes of individual reflexivity: a) communicative reflexivity, meaning that internal conversations need to be confirmed and completed by others before they lead to

action; b) autonomous reflexivity, where internal conversations are self-contained, lead directly to action and are characterised by instrumental rationality; c) meta-reflexivity occurs when internal conversations critically evaluate previous inner dialogues and are critical about effective action in society in promoting value rational action; and d) fractured reflexivity, where internal conversations cannot lead to purposeful courses of action and only intensify personal distress and disorientation, leading (temporarily) to passive agents. Archer (2010b; 2013b, p. 11) argued there is no reason why collective reflexivity should not be characterised in the same manner as modes of personal reflexivity: a) collective communicative reflexivity is practised among family and closest friends; b) collective autonomous reflexivity as the pragmatics of group well-being; c) collective meta-reflexivity when considering relational enhancement or protection; and d) collective fractured reflexivity if the contingencies of life in an open system, including openness to the creativity and destructiveness of others, will deprive us of its emergent fruits by destroying the bonds upon which that of great worth is relationally dependent.

Collective reflexivity is not about people thinking in the same way, or people sharing external commitments, or people having a mutual intention; rather it is about people being in a special relation and that relation is what makes them reflexive in a social, instead of a personal way (Donati, personal communication, cited in Archer, 2010b; 2013b, p. 11). This special relation is the collective reflexivity, and was used in this study to identify collective reflexivity in EA implementation.

In identifying the important mechanisms triggered by EA implementation programs in the HE sector and University X in particular, the central role of reflexivity provides the basic condition for explaining the people-focused mechanisms identified from the MA cycles. Archer concluded that reflexivity acts as a key mediatory mechanism: "...reflexivity is crucial for bridging the gap between formal expectations and actual eventualities in the open social system" (Archer, 2010a, p. 281) and suggested:

...it is necessary to look more closely at the interconnections between the relationships summarized in the basic diagram [Figure 4.10]. Within any cycle this is to clarify {relation a}, that is, how structural/cultural conditioning effectively influences sociocultural interaction. Without such clarification, the term "conditioning" merely rules out any form of determinism, but does

not arbitrate between two possible answers: conditional influences are exerted largely through [...] the exercise of reflexivity, entailing deliberation about the appropriate course of action in a given social context (Archer, 2010a, p.276).

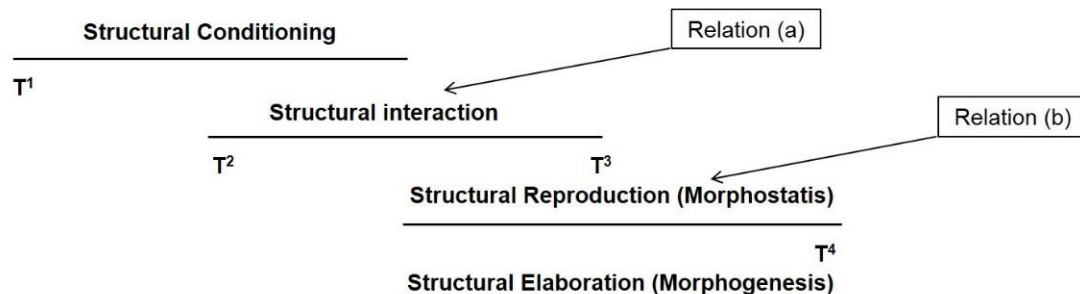


Figure 4.10: How reflexivity works in the basic morphogenetic sequence (adapted from Archer, 2010a, p. 275)

Mutch (2007) expressed the opinion that MA is focused on the structure and culture shaping the context in which agency is exercised, thus agency reflexivity is shaped by the interplay between context (the social situation) and concerns (the personal concerns of agents). At this level it can be argued that by applying reflexivity to EA as an organisation-wide program with a strong social context the study can examine the role of people's reflexivity by the way the program impacts people's ultimate decisions concerning ('concerns') EA implementation. Hence, the reflexive mediation of mechanisms ensures that people have the necessary mechanisms in place to enable architecture transformation.

In Figure 4.11 below, Archer (2010a, pp. 280-281) argued the continuity of morphostatic societies make a substantial contribution to low reflexivity, since agencies possess the situational logics of morphostatis (see Figure 4.8):

...the co-existence of cultural and structural morphostasis together generated a high and lasting degree of everyday "contextual continuity" for the populations in question: repetitive situations, stable expectations, and durable relations...", as the, "...continuity of morphostatic societies (generative of contextual continuity) was underpinned by a low level of structural differentiation and an equally low degree of ideational diversification –the two being mutually reinforcing. Thus, the structural elite

was trapped in the only form of cultural discourse in parlance, given the absence of an alternative fund of ideas; similarly, the cultural elite was enmeshed in existing leadership roles, given the lack of any other form of social differentiation. Cultural morphostasis, through the stable reproduction of ideas among a unified population, generated an ideational environment that was highly conducive to structural maintenance. Equally, structural morphostasis, through perpetuating subordination and thus controlling differentiation, made a substantial contribution to cultural maintenance.

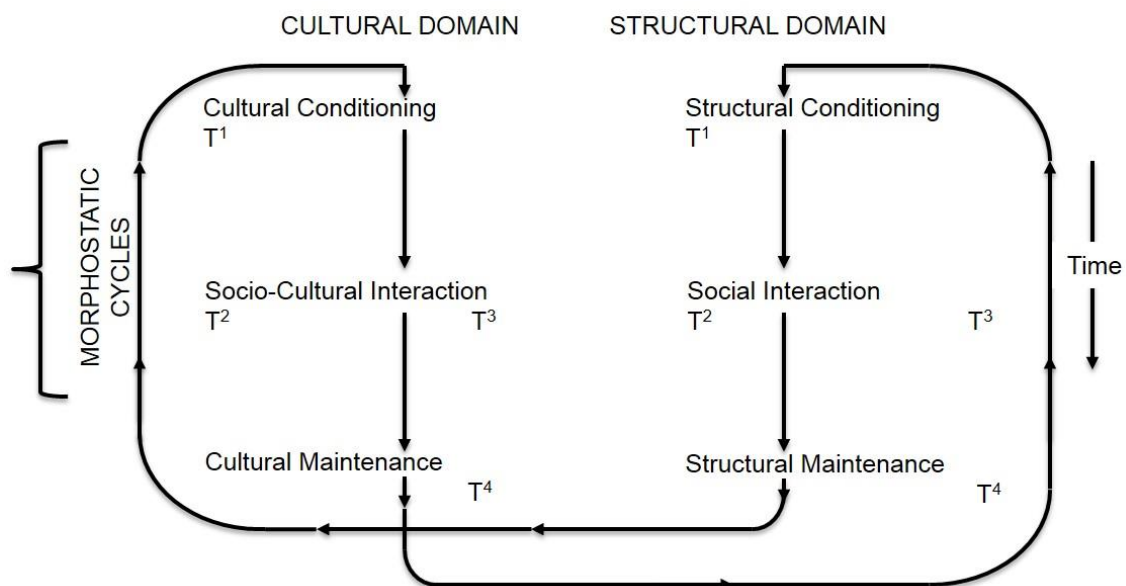


Figure 4.11: Morphostatis: Contextual continuity – low reflexivity (adapted from Archer, 2010a, p. 281)

In contrast, Figure 4.12 below illustrates Archer's (2010a, p. 284) contention that increases in reflexivity result from discontinuity of morphostatic societies, and has made a substantial contribution to predominant reflexive action as the agencies possesses the situational logics of morphogenesis (see Figure 4.8):

From the 1980s onwards, the synergy between multinational production and information technology resulted in unprecedented morphogenesis, whose generative mechanism is for variety to spawn more variety. With it, the situational logic of opportunity began to emerge at both corporate and

individual levels for the first time in human history, at variance with modernity's zero-sum "situational logic of competition." This is what Thévenot terms the "imperative of innovation" (2006, 2008:14) and it constitutes the condition for "the reflexive imperative." On the one hand, exercising personal reflexivity in order to make choices in uncharted territory means that the previous guidelines, embedded in "contextual continuity," are fast vanishing as they become increasingly misleading. On the other hand, the prizes in work and employment start going to those who detect, manipulate, and find applications for links between previously unrelated bits of knowledge; ones whose contingent complementarity could be exploited to advantage. The "winners" become such by extruding their skills to match the fast shifting array of opportunities or making their own opportunities by innovating upon contingency. All of this fosters the "reflexive imperative" because the old routine guidelines [Figure 4.11] are no longer applicable and new ones cannot be forged because (even) nascent morphogenesis [Figure 4.12] is inhospitable to routinization.

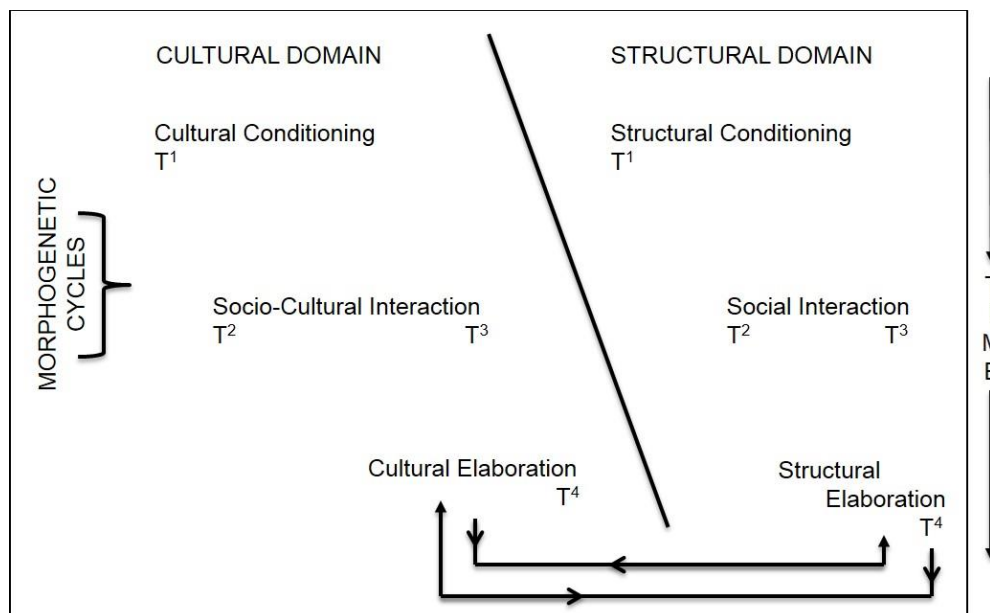


Figure 4.12: Morphogenesis: Contextual discontinuity – predominant reflexive action (adapted from Archer, 2010a, p. 284)

Understanding reflexivity modes and mechanisms for acceptance helps to guide suggestions for conditions necessary for successful EA implementation. This is predicated on Archer's

suggestion that individuals will react differently to EA impositions depending on their current projects and ultimate life-concerns.

4.5 Contextual Influences: The Dynamic of Complex Social Program Surrounding the Architecture

EA is a means of enabling informed decision-making on IT-business transformation as well as ensuring compliance with EA governance (Op 't Land et al., 2009). The social complexity surrounding the architecture is a function of the number of stakeholders involved; the variety of concerns, socio-political dimension, diversity in their backgrounds, and work culture that brings complex behavioural attributes into the governing of EA program and its implementation (Op 't Land et al., 2009; Bente et al., 2012; Janssen, 2012). The increasing complexity of the social issues facing enterprises as well as the growing diversity and heterogeneity of the concerns and interests of the stakeholders involved renders pre-existing approaches less adequate.

Seen from the perspective of a complex social program surrounding the architecture, a useful point of departure is Pawson, Wong and Owen's (2011) realist review, which focuses on the dynamics of complex social programs. These authors suggested:

1. Programs are active, not passive. Interventions do not work in and of themselves; they only have affect through the reasoning and reactions of their recipients.
2. Programs have long implementation chains and multiple stakeholders. Recipients are many and varied; reactions to programs thus differ; outcomes are thus generally mixed.
3. Programs are embedded in complex social systems. Recipients are rooted in different localities, institutions, cultures, histories, all of which shape the fortunes of a program.
4. Programs are implemented amid the turbulence of other interventions. The policy agenda is delivered through a multitude of interventions, each one interfering with the reception of another.
5. Programs beg, steal, borrow, and adapt. Practitioners work constantly to improve the delivery of interventions rather than preserving uniformity to meet evaluation and trial requirements.

6. Programs are the offspring of previous interventions. Social problems are longstanding; interventions evolve to try to combat them; the success of a current scheme depends on its history.
7. Programs change the conditions that make them work in the first place. An intervention's success is always time limited since alleviating a problem always involves changing its concomitant causes (p. 519).

Prevailing organisational structures, regulations, etc., have become ingrained in agency (people), structure, and culture of an enterprise. Due to the complexity of social programs as interrelated business processes, people and technology, stakeholders are keen to find a way of harnessing this complexity when judging the impact on their concerns (Op 't Land et al, 2009).

During implementation, EA programs deal with social complexities and pre-existing social structures within organisations. Janssen (2012) argued:

...there is a need for reconceptualising EA. We plea[d] for a broader look at EA that includes both capabilities and a governance structure and mechanisms. Doing EA should be incorporated in every day's processes [...]. The use and acceptance is determined by the social processes surrounding the architecture. As such, there is a need to swap from the dominating blueprint focus to a relational and governance focus. The use of effective governance widens the scope from having merely a technical focus and being an artefact toward viewing EA from a broader socio-political perspective (p. 34).

Unfortunately, organisations with effective IT governance can still encounter an ineffective EA implementation program. As the starting point for the change process in IT-business transformation, EA programs face a number of significant challenges. Fundamental to this is that EA identifies the contextual influences of the real-world social complexity surrounding the architecture. As identified by Ross et al. (2006, p. 80) "optimized core [of the EA program] means that local managers lose discretion over core business process and some times over the people and the systems that execute them". As demonstrated by Archer (1995; 2015),

people offer a stratified representation of their role in organisational change as they can be seen to act as: (a) primary agents in particular positions who can generate important social consequences; (b) corporate agents in institutions who can organise themselves in pursuit of certain goals and articulate the changes they seek; and (c) individual actors in particular roles who acknowledge their vested interests and weigh these interests against one another. In the same fashion, de Vaujany (2008) argued people can also be seen to act as: a) an individual/person with a personal and embedded history; b) agents with cultural, economic and demographic features; and c) actors related to a social group with specific interest and strategies. Considering the social complexity of the role of people in EA programs we see that they are shaped by the interplay between contexts (the social situation) and concerns (the personal concerns). In such situations people are likely to suggest that the program be more socially dynamic with varying levels of complexity and thus influence the architecture transformation. Figure 4.13 below illustrates how contextual influences impact EA programs.

Figure 4.13 below illustrates how EA programs feature in the contextual influences of a dynamic social program.

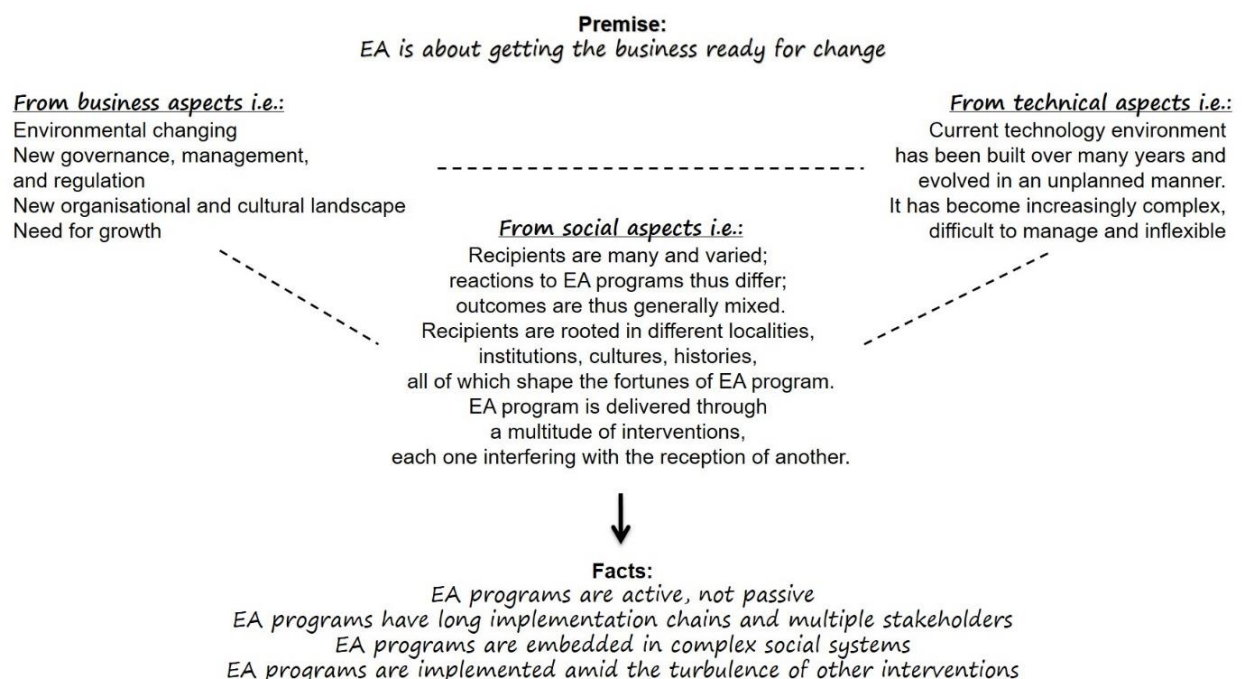


Figure 4.13: Picturing EA from the dynamic of social complex program surrounding the architecture

4.6 Summary: Research Question Identified from Literature

This study identified a number of research questions pursuant to a literature review of disciplines associated with EA from a critical realist perspective. Since the EA implementation program under study was unique given the social complexity of the university environment, the critical realist literature primarily assisted in identifying central elements of the research questions. To appreciate the explanatory context of the study the research questions mainly built upon Archer's morphogenetic approach, supported by Archer's reflexivity theory: a) macro-micro context (identifies the situational mechanisms of the cultural and structural systems that pre-exist people's action); b) micro-micro (identifies the mechanisms of action and interaction between structure and culture); and c) micro-macro (identifies the transformation mechanisms that constrain and enable people's actions to adopt the EA program or not).

Significant issues and gaps in the EA literature are used to identify the specific objectives of the study. The findings of the literature review showed that EA programs have mainly been viewed from a technical perspective, regardless of any real influence of the complex social context on EA. There is limited research to date that uses the social complexity of EA programs as a starting point from which to investigate the social responses triggered by implementation that might constrain or enable success in the university environment.

Therefore, to explore the interplay between structure, culture and people, the main research question of this study sought to answer: "What are the key implementation mechanisms and social responses triggered by EA implementation that might constrain and enable the success of the EA program in University X and the sector in general?" The main research question was supported by four sub-questions as shown below.

Table 4.4 Sub-research questions and sub-research objectives

No	Sub-research question	Sub-research objective
1	What are the important situational mechanisms, that by virtue of associated social structure and culture, causally condition individuals' actions?	Identify the situational mechanisms by which social structure conditions individuals' actions and how cultural environments shape their social situations.
2	What are the consequent interaction mechanisms triggered by EA implementation at University X?	Describe the interactive mechanisms linking the social situation (context) and the people's personal concerns (people's thoughts and ideas that tend to consider themselves – their desires, beliefs, values, acquaintances and interests) to influence their actions.
3	How does the existing culture and structure within UX impact the EA implementation and shape the interaction mechanisms triggered by the implementation?	Identify the cultural and structural dimensions of an action context, both how they shape and are shaped by groups of individuals.
4	What are the necessary conditions to encourage individual and collective acceptance of EA practices?	Specify the transformational mechanisms by which individuals, through their actions and interactions, generate various in-tended and unintended social outcomes

A detailed examination of the interrelationships of the research questions will be presented in section 5.3 and 7.2

CHAPTER FIVE: RESEARCH APPROACH

5.1 Overview

This chapter discusses the methodology of the research; the underlying philosophy and its methodological framework; the explanatory context of the research questions; the research design used for the study; its limiting factors; and the ethical considerations of the research. Given that enterprise architecture (EA) is an organisation-wide initiative with a strong social impact, and in order to address the need for greater recognition of the role of people and the social aspects of EA implementation, this study used a critical realist framework and its most recognised methodology, the morphogenetic approach (MA), as a useful tool for theorising and examining EA and its implementation from a social perspective. The explanatory method provided an important link between the technological and social phenomena in the domain of information systems (IS) with critical realism (CR) as the underlying philosophy. The research approach provides a consistent linkage of realist ontology and the methodology for practical social outcomes, and brought together two areas of study, namely EA and social systems.

5.2 The Underlying Philosophy and its Methodology Framework

5.2.1 The underlying philosophy

An exploration of people, who are socially transformed in the course of IT-business transformation during EA implementation, requires a deep understanding of the structural and cultural systems in which they operate, as well as the mechanisms of social change. Archer (2015) argued the enterprise is “...the site of an extraordinarily powerful set of mechanisms of social change in the modern world...”, [and] “...the structures [and cultures] at the heart of its workings appear to be relatively unexplored” (p. 214).

It is difficult to identify inherent structures, cultures and mechanisms with traditional EA methodologies and frameworks, particularly in knowledge societies with strong social hierarchies such as universities. Implementing IT-business transformation provokes tension between structure and culture, not only between IT and business people, but also between

departments (faculties, schools and service centres) that do not exist in industry to the same extent, and this poses a particular challenge to implementation of EA in higher education (Anderson & Backhouse, 2009).

This study therefore required a deep understanding of the structural and cultural systems and the mechanisms in place to appreciate how stakeholders reacted to the new impositions; both in terms of increased governance and the way they did things. Based on the findings in the previous chapter, this study used CR as the underlying philosophy to incorporate a strong social element in its analysis. According to Danermark et al. (2002) critical realism sees “...the world as structured, differentiated, stratified and changing”, thus “within philosophy, critical realism involves a switch from epistemology to ontology, and within ontology, a switch from events to mechanisms” (p. 5).

CR ontology views the social world as three overlapping domains: the empirical, the actual and the real (Bhaskar, 1978). Mingers (2004) elaborated on Bhaskar’s (1978) and Archer et al.’s (1998) arguments to provide a more detailed understanding of CR ontology in reference to social reality:

For Bhaskar, reality is both intransitive (existing independently of humans) and stratified (Archer et al., 1998: p. 41). The first form of stratification is between mechanisms; the events that they generate; and the subset of events that are actually experienced. These are known as the domains of the real, the actual, and the empirical [...]. The real contains mechanisms, events, and experiences—i.e., the whole of reality; the actual consists of events that do (or do not) occur and includes the empirical, those events that are observed or experienced (p. 93).

Bhaskar (1978) proposed events or phenomena should not be the core focus of research; instead the focus should be on the structures (and cultures) and mechanisms that generate phenomena. Similarly, Danermark et al. (2002) stated:

To switch from events to mechanisms means switching the attention to what produces the events – not just to the events themselves. Reality is here assumed to consist of several domains [the real, the actual, and the

empirical]. One of these is that of mechanisms. These mechanisms sometimes generate an event. When they are experienced they become an empirical fact. If we are to attain knowledge about underlying causal mechanisms we must focus on these mechanisms, not only on the empirically observable events (p. 5).

Figure 5.1 below illustrates how EA implementation uses critical realist ontology to understand how and why EA programs work or fail to work.

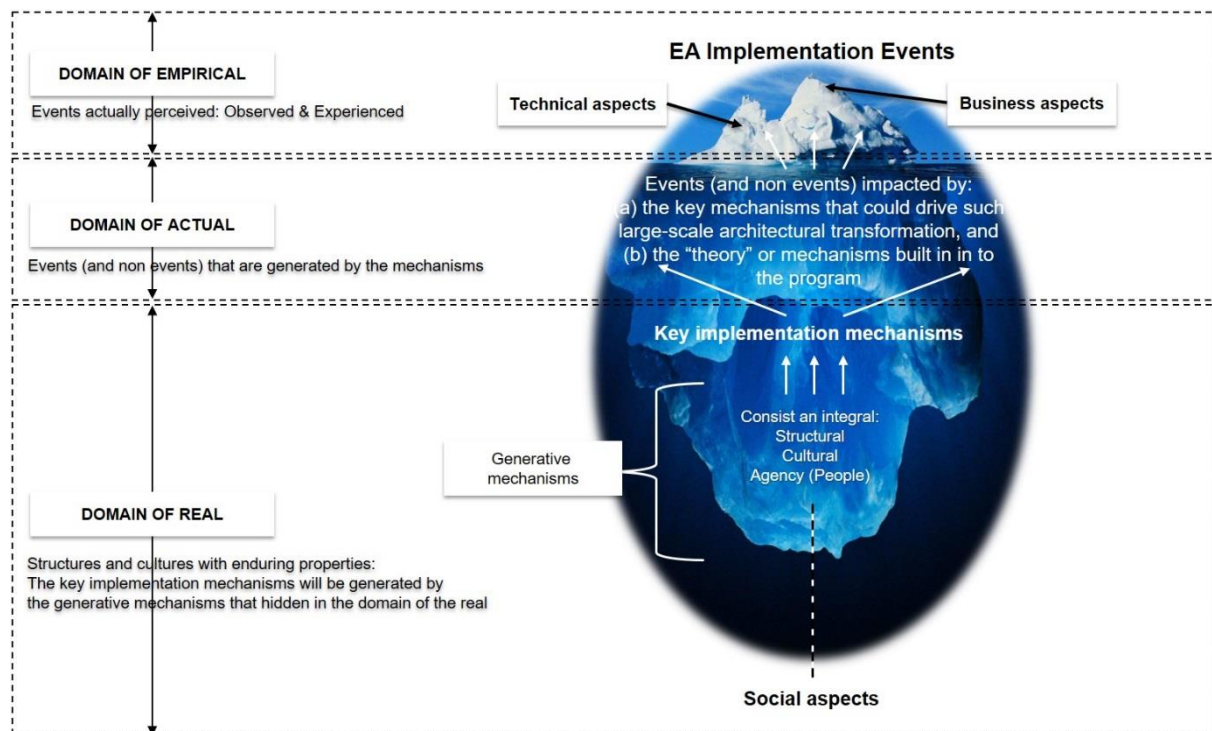


Figure 5.1: Mapping the EA implementation on the critical realist ontology

Sayer (1992) supported CR ontology in reference to social reality with his conclusion that CR generally works with causal explanatory analyses involving both abstract and concrete studies. Figure 5.2 shows Sayer's (cited in Danermark et al., 2002) set of events (concrete activities), mechanisms and structures/cultures (abstract activities) as they exist in a complex and compound whole, for example in human society. Danermark et al. (2002) explained:

When the structural mechanisms are activated, they produce certain effects, depending on what other mechanisms they at the time happen to combine with. A particular mechanism can produce completely different actions at

different times, and inversely the same event can have completely different causes (p. 58).

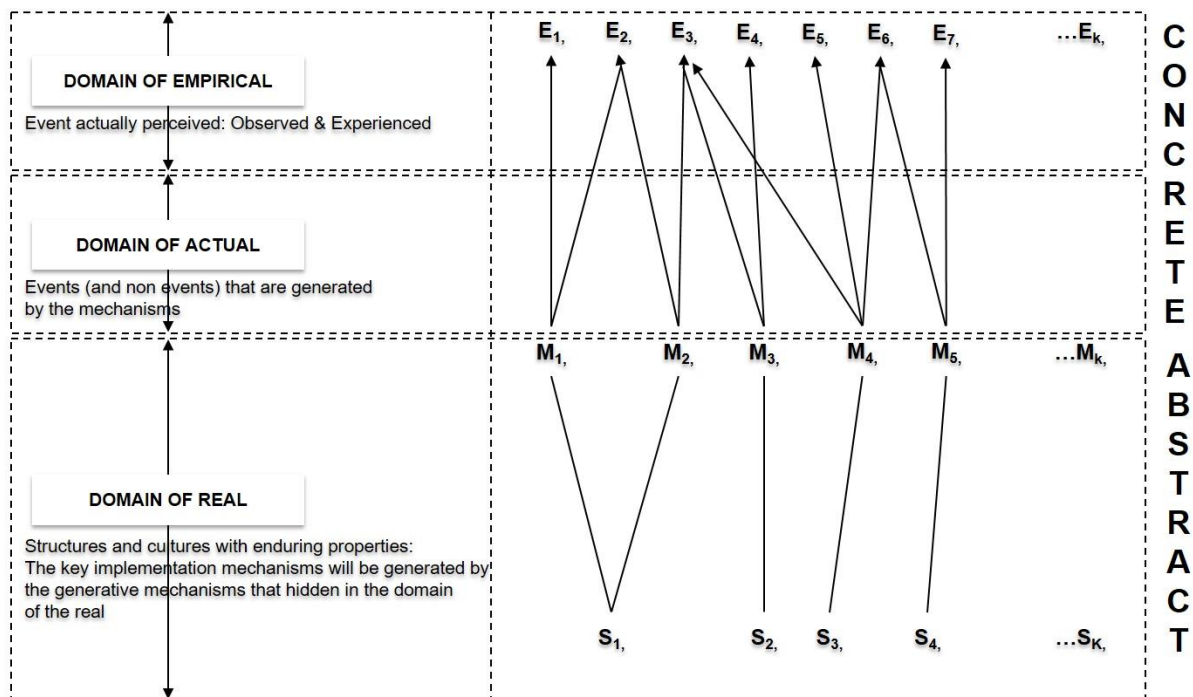


Figure 5.2: Mapping Sayer's causal explanatory analyses of concrete and abstract activities on the critical realist ontology

Danermark et al. (2002) expressed the view that reality (in abstract activities) is not a series of events, and a set of events is part of concrete activities:

Against empiricism and objectivism, critical realism further claims that the method of obtaining knowledge cannot be reduced to observation of events. Reality is not a series of events, where one thing follows on another with empirically observable regularity. The relation between reality and our knowledge about it comprises, as we have seen, three distinct ontological domains: the empirical (our experiences), the actual (events), and the real, where the mechanisms are what produce the events in the world (p. 203).

Given the heavy social emphasis of this study, it is safe to assume that applying CR as the underlying philosophy to examine the role of people and the social aspects of EA implementation can provide a useful perspective for theorising and examining the people-focused mechanisms within a IS domain. Mingers (2004) explained:

Critical realism is important for IS because: (i) CR enables us to take a basically realist stance whilst accepting the major critiques of naive realism; (ii) it addresses both natural and social science and thus encompasses the main domains of IS; and (iii) does potentially fit well with the reality of IS as an applied discipline (p. 97).

Dobson (2009) also stated:

In researching the social context within which information technology (IT) and IS operate, a modern social philosophy such as critical realism has considerable potential. It can provide useful insight into the type of (retroductive) questions that may be asked and also the means by which an examination can progress. The integrated nature of the philosophy encourages a consistency in research in that it recognizes the tripartite connections between ontology, methodology, and practical theory (p. 808).

5.2.2 The methodological framework

In order to appreciate the importance of CR as a philosophy in identifying the key mechanisms for explaining EA success or failure, the framework proposed by Danermark et al. (2002, pp. 109 – 110) was adopted to guide the methodology for the study. This framework allows the researcher iterative movement between concrete and abstract activities in order to refine explanations by retroduction (Blundell, 2007). According to Sayer (cited in Blundell, 2007), retroduction is a form of scientific inference that discerns underlying structures and mechanisms capable of causing events in the social world.

The framework describes six stages. The first explains the often complex and composite event, situation or phenomenon, by making use of a number of sources like theoretical perspectives, existing research, observation and actors' own accounts, among others. Analytical resolution is the second stage, which separates or dissolves the composite and the complex by distinguishing the various components, aspects or dimensions. In the third stage this explanatory framework interprets and redescribes the different components or aspects from hypothetical conceptual frameworks and theories about structures and relation. This stage is referred to as "abduction" or theoretical redescription, where the original ideas of

the object of study are placed in a new context of ideas. It describes several different theoretical interpretations and explanations for later comparison and integration, and is followed by retroduction.

The fifth stage entails a comparison between different theories and abstractions and, elaborates and estimates the relative explanatory power of the mechanisms and structures in the problem being investigated. According to Danermark et al. (2002), this stage might conclude with one theory describing the necessary conditions for what is to be explained, and therefore has greater explanatory power.

Finally, concretisation and contextualisation make up the sixth stage, which examines how different structures and mechanisms manifest themselves in alternate concrete situations, and tests the applicability of proposed mechanisms in specific contexts of the problem being investigated. The framework can therefore be seen as a guide for an explanatory study based on CR.

In this study, the methodological framework (Figure 5.3) only described the initial five stages of the explanatory framework, since the focus of the research was on uncovering the people-focused mechanisms by identifying the important mechanisms of EA (Stages 1 and 2) and building a theoretical explanation of the role of people as a key element in EA implementation (Stages 3 to 5). As suggested by Danermark et al. (2002, p. 109):

...this model (containing six different stages) should be seen as a guideline and not as a template to be followed to the letter. Research processes can and should be structured in different ways.

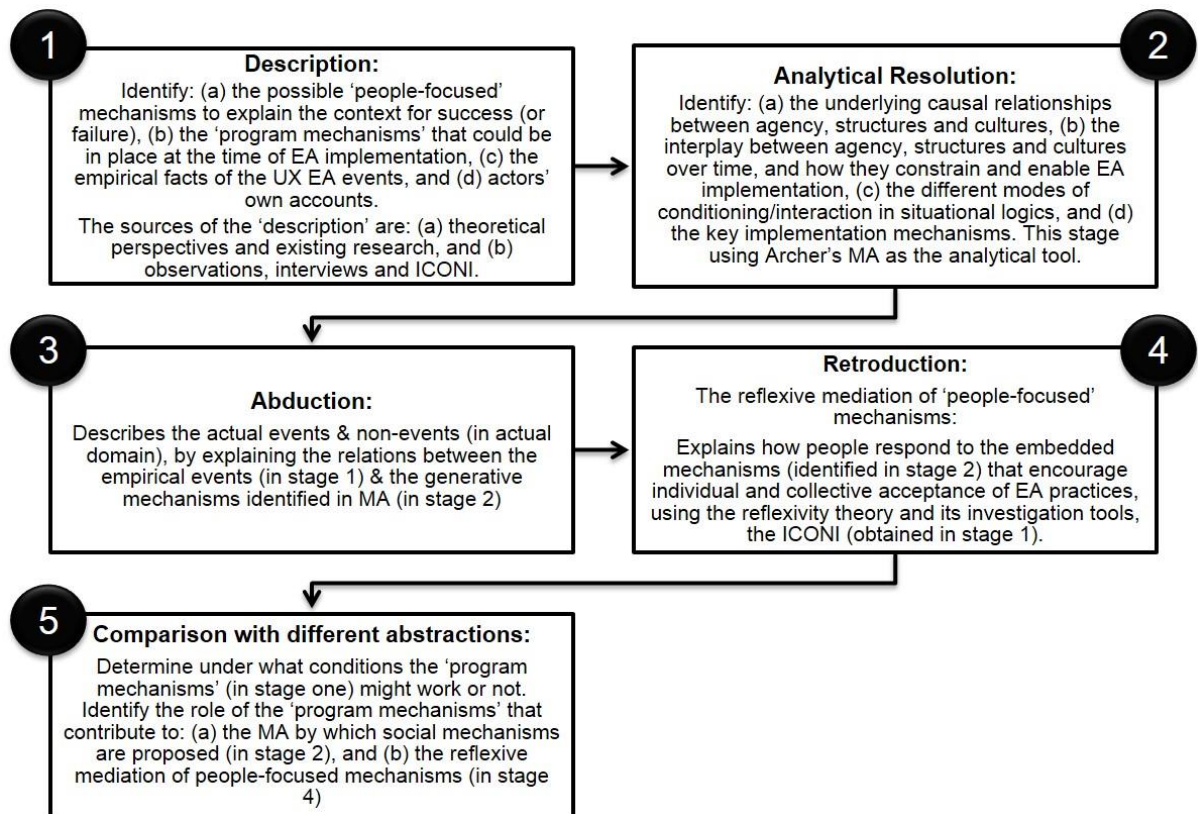


Figure 5.3: Research methodology framework (adapted from Danermark et al., 2002)

The first stage of the methodology framework, *Description*, determined a) the possible people-focused mechanisms to explain the context for success or failure; b) the program mechanisms that were in place at the time of EA implementation; c) the empirical facts of EA events at University X; and d) the actors' own accounts. This stage explains the often complex and composite events, situations or phenomena by making use of a number of sources, such as a) theoretical perspectives and existing research; and b) interviews and observations.

The first material source, theoretical perspectives and existing research, examined the extent to which people are identified in existing EA research, the TOGAF framework, and existing CR research that defines possible people-focused mechanisms and program mechanisms (EA theory). It provided the following:

1. From existing EA studies and theories (Chapter 2):
 - a) Identification of EA implementation challenges and governance; and
 - b) Identification of possible program mechanisms and contexts for success and failure of EA implementation.

2. From the TOGAF-based implementation framework (Chapter 2):
 - a) Identification of the important role of people and their relationships;
 - b) Identification of the important milestones and core events that need to be considered over the implementation period;
 - c) Identification of the role of people beyond purely technical capacities within the EA maturity model (ACMM);
 - d) Identification of the program mechanisms involved in a TOGAF framework; and
 - e) Identification of the TOGAF-based implementation framework in the higher education sector.
3. From an industry perspective (Chapter 2): Identification of EA failures that can to propose possible success mechanisms.
4. From EA implementation in the higher education (HE) sector (Chapter 2):
 - a) Identification of the naturally conservative nature of universities;
 - b) Identification of the social interaction operating at the structural and cultural levels;
 - c) Identification of important implementation challenges which need to be addressed; and
 - d) Identification of possible program mechanisms are used at the time of EA implementation.
5. From a social theoretical and CR-research lens (Chapter 3 and 4):
 - a) Examination of various versions of social realism and a description of how the adoption of each has fundamental implications for the research process and ultimate outcomes;
 - b) Determination of critical realism as the underlying philosophy of the research, a morphogenetic approach as the main analytical tool, and a central role for reflexivity in the implementation program; and
 - c) Identification of the contextual influences on a dynamic and complex social program of the surrounding social context.
6. Specifying the research questions identified from the literature review and potential contextual mechanisms – both for the program mechanisms (Chapter 2) as well as the social mechanisms (Chapter 4).

The second material source, observations and interviews, examined the empirical facts of EA events at University X using materials obtained from observations (directly and indirectly) and a review of archival data (secondary data). During this stage, primary data of people's personal accounts of EA implementation in University X were collected using interviews and the Internal Conversation Indicator (ICONI: explained later in the following section). These empirical materials were analysed in the second stage of the methodological framework of the study – *the Analytical Resolution*.

In Stage 2 (the Analytical Resolution) the stage one representation was resolved by using Archer's MA as the main defining tool. This involved primary and secondary data collection from the actual case study (University X) and provided the following:

1. Identification of the possible underlying causal relationships between people (agency), structure and culture in University X to gain an understanding of how stakeholders affect and are affected by EA implementation;
2. Examination of the interplay between agency, structure and culture over time (from Time 1 – Time 4 in MA) in University X and how they constrained and enabled EA implementation;
3. Identification of the different modes of conditioning/interaction in situational logics (generative mechanisms); and
4. Identification of the key implementation mechanisms and social responses triggered by EA implementation and generated by the transformation mechanisms to describe the important mechanisms and social responses that drove such large-scale architectural transformation.

Figure 5.4 below illustrates how Archer's MA was used in the analytical resolution stage.

Stages three, four and five also involved collection of primary and secondary data from University X. In the case study (stage three) *abduction* was used to seek a connection or relation, not directly observable, between the EA events (in the empirical domain) and the identified EA context (mechanisms and situational logics in the real domain – MA) during EA implementation. The abduction stage provided useful insights into the actual domain, which are not directly observable during EA implementation. This stage identified:

1. The social situations influenced by activities associated with EA implementation; and
2. The social situations influenced by the willingness of members of University X to cooperate with each other in order to realise EA implementation.

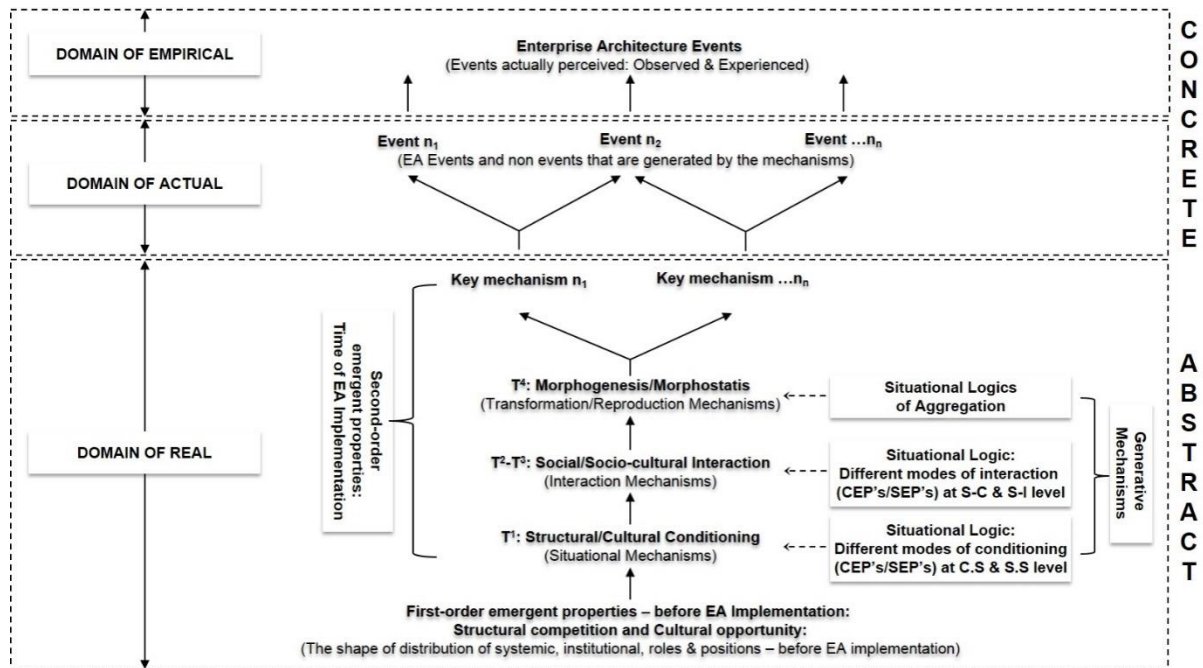


Figure 5.4: Mapping the morphogenetic approach on the critical realist ontology

Stage four, *retroduction*, described a mode of inference by which this study arrived at what is basically characteristic and constitutive of people adopting EA, since MA (Stage 2) still posed the central problem of how social structure, culture and agency were actually linked (their social relationship: Archer, 2008). This stage clarified the basic conditions for social relationships: people's actions and interactions; identifying people-focused mechanisms; reasoning and knowledge of EA implementation. In clarifying these basic conditions which are not directly observable, retroduction went beyond the empirical (something that can be observed and experienced) by using reflexivity theory (Archer, 2008; 2010a) to attain knowledge about what internal relations made EA implementation at University X succeed or not. This stage:

1. Identified how people subjectively defined a particular course of action (people's personal concerns) in relation to their social circumstances (context of EA) by using the reflexivity investigation tool, the ICONI (obtained from the Description stage);

2. Explained how structures and cultures constrained and enabled agents (obtained from the *Analytical Resolution stage*) to adopt EA programs, or in critical realist terms, the “reflexive mediation of mechanisms”; and
3. Identified the “collective reflexivity” or social relationships to explain the special relations amongst people and what made them reflexive in a social, instead of a personal way with regard to EA implementation.

Finally, the fifth stage elaborated and estimated the relative merits of each abstraction/theory in explaining the observed happenings:

...the relative explanatory power of the mechanisms and structures (and cultures] which have been described by means of abduction and retroduction within the frame of stages three and four [in the methodology framework of the study – see Figure 5.3]. (Danermark et al., 2002, p. 110)”

Typically, the purpose of this stage is to bring to light the theory of the program mechanisms (obtained in the *Description stage*) to determine the conditions under which the program theory might work or not: “what works”, “for whom” and “in what circumstance”. Pawson and Tilley (1997; 2004) recommended a focus on understanding the theory underlying program mechanisms to understand and explain the impact of program outcomes that might be creating change. Understanding the theory underlying program implementation is helpful in deriving the mechanisms by which architecture transformation is achieved or not. This stage provided the following:

1. Identification of the program mechanisms (obtained in the *Description stage*) which contributed to CR theories that propose social mechanisms (obtained from the *Analytical Resolution stage*); and
2. Examination of how different program mechanisms (obtained in the *Description stage*) supported different parts of: a) the social mechanisms proposed by MA (obtained from the *Analytical Resolution stage*); and b) the reflexive mediation of people-focused mechanisms (obtained from the *Retroduction stage*).

5.5 below illustrates how the study methodology framework plays on the ontological of CR.

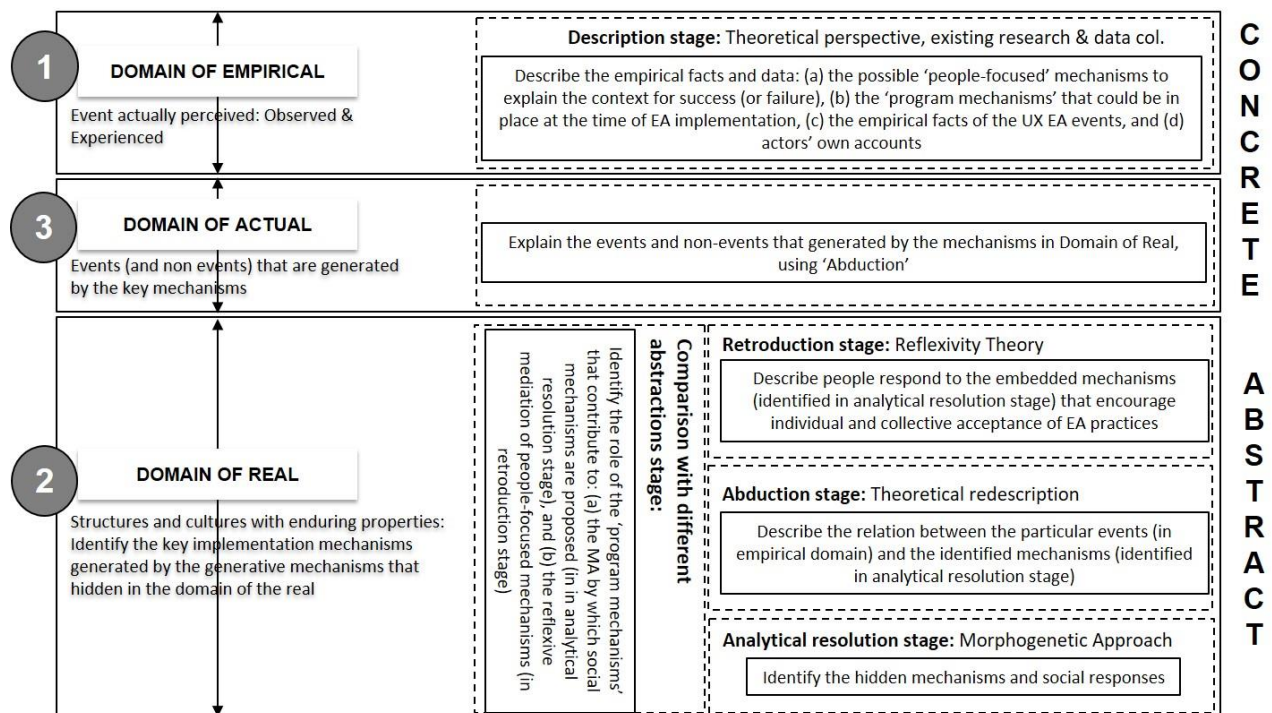


Figure 5.5: Mapping the methodology framework on the critical realist ontology

In Figure 5.5 it is evident that the stages of the methodological framework of the study, when applied to the ontology of critical realism, do not follow each other in a strictly chronological order. For instance, the abduction stage was used to identify events and non-events in the actual domain. However, the framework will be intertwined with the ontology, since the focus of the study is to fit into the ontology by attempting to obtain knowledge of constitutive qualities and causal mechanisms generating events. As explained by Danermark et al. (2002):

Such a model [the methodology framework] should be guiding the research that is trying to attain knowledge of constitutive qualities and causal mechanisms generating events, but also knowledge of how different mechanisms cooperate and, under specific circumstances, contribute to the production of concrete events and processes. (p. 108) [Thus], "The separate stages can also be intertwined and need not follow each other in a strictly chronological order. In research practice it can often be necessary to switch between the different stages. In a concrete study there may also be reasons

for concentrating on certain stages and touching upon the others more lightly (p. 109).

This methodological framework guided the research process with a critical realist foundation and brought consistency to ontology, methodology, and practical theory related to IS research. Danermark et al. (2002) stated:

The model [the methodology framework] describes the research process as a way from the concrete (stage 1) to the abstract (stages 2–5) [...]. Every stage (except the first) in itself involves such a swing between different levels of abstraction. Abstraction and concretization provide two different types of knowledge about reality, both important but not to be confused or reduced to one another [...] (p. 109).

To summarise, the methodological framework of this study steered the research process towards an understanding of the people-focused mechanisms in the EA implementation, and its interplay with structures, cultures, and agency (people), by building upon a theoretical explanation of the key role of people in EA implementation, most notably in the university sector.

5.3 Explanatory Context of Research Questions

The social realist literature primarily assisted in identifying the central element of the research questions of the study (see Chapter 4). Significant issues and gaps identified in the EA literature were used to define the specific objectives of the study, that is to define the program mechanisms and social responses built into EA implementation (see Chapter 2). Using an explanatory context with a CR-philosophy foundation, the research questions mainly seek to identify important mechanisms that might constrain and enable the success of EA implementation. The explanatory approach was determined by complex and often difficult mechanisms covering causal laws (Archer, 2015), however, the approach was aimed to provide a real basis for causal explanation, particularly social explanation. As explained by Tilly (2001, cited in Archer, 2015, p. 161): "...explanation by mechanisms must be regarded as one of the main explanatory strategies adopted in the social sciences...", thus "...a deep scientific explanation is an answer to a question of the form, "How does it work, that is, what

makes it tick – what are its mechanisms?”” (Gorski, 2004a, cited in Archer, 2015, p. 2). Equally important, Archer (2015) suggested: “It is the generative mechanism that supplies the real basis for causal laws. Nevertheless, no law simply expresses the universal manifestation of causal powers operating in the open system that is the social world. Explanation will be realist rather than dependent upon empiricism (p. 3).”

The research questions provided the mechanism-based explanations and involved theory-oriented accounts of episodes in the macro–micro–macro contexts from: a) Archer’s MA schematic stage (structure, culture and agency/people: SCA); and b) reflexivity theory (only effective as mechanisms if people adopt them) to identify mechanisms constituting the context within which the program operated. The macroscopic context explored the interplay between structure, culture and agency; and uncovered the social mechanisms under which the EA program was implemented. Context also explored the program mechanisms built into EA implementation associated with theory gathered in the EA literature review. The microscopic context explained how people reflexively responded to the embedded mechanisms of EA implementation. People’s reflexive deliberations also formed an important mechanism for explaining how structures/cultures constrained and enabled agents to adopt the program.

As discussed in chapter 4, the main research question that this research sought to address was: *“What are the key implementation mechanisms and social responses triggered by EA implementation that might constrain and enable the success of the EA program in University X and the sector in general?”* It was supported by four sub-research questions as follows:

1. What are the important situational mechanisms, that by associated social structure and culture, causally condition individuals’ actions?
2. What are the consequent interaction mechanisms triggered by EA implementation at University X?
3. How does the existing culture and structure within University X impact the EA implementation and shape the interaction mechanisms triggered by the implementation?
4. What are the necessary conditions to encourage individual and collective acceptance of EA practices?

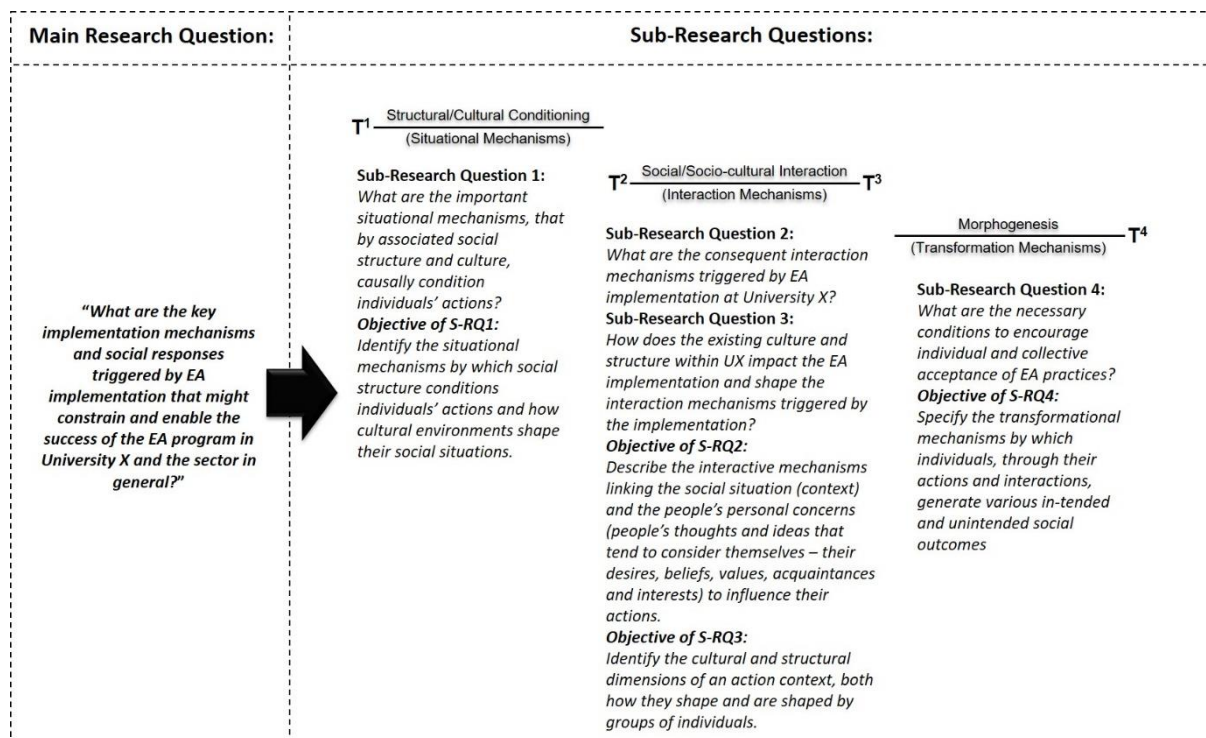


Figure 5.6: The schematic diagram of research questions: The interplay within and between the cycles of social change in morphogenetic approach (adapted from Archer, 1995, pp. 193, 218, 295, and 303)

Figure 5.6 presents a multi-dimensional cycle of change in the MA stage associated with the research questions. The schematic diagram also shows the connection between the macro–micro–macro contexts in Archer’s MA (T¹ to T⁴). The research questions were operationalised under Archer’s meta-theory of analytical dualism, and thus bridged the social realist theory between the explanatory power of MA (T¹ to T⁴) and reflexivity theory (T² – T³) to strengthen the study’s objectives and its outcomes, since MA still presented a fundamental problem in terms of how social structure (and culture) and agency are linked (their social relationship) (Archer, 2008). The schematic diagram presents a three-stage morphogenetic/morphostatic cycle (time, from T¹ to T⁴, is incorporated as sequential tracts) and covers social structure, culture and agency. Through analytical dualism, the study separated social structure (and culture) and agency, and examined their interplay to account for structuring and re-structuring of the social order. This was possible because social structure, culture and agency are different kinds of emergent entities, with different properties and powers, despite the fact that they are crucial for each other’s formation, continuation and development. Horrocks (2009) described it thus:

Although analytically and temporally separable, the three interrelated cycles of emergence – interplay – outcome are continuous and, therefore, ‘when studying any given problem and accompanying periodisation, the projection of the three backwards and forwards would connect up with anterior and posterior morphogenetic cycles’. The delineation of the cycles is according to ‘the scope of the problem in hand’ with each cycle containing the same three core stages. The result is that it becomes possible to set out the conditions under which change or reproduction is likely to occur in social/structural/cultural contexts and produce an analytical history of this without having to resort to a determinist approach (p. 40).

In brief, through a multi-dimensional cycle of change in MA, the research questions explored and elaborated on the role of people in EA implementation in terms of social structural, cultural and agential change – either morphostatic (reproduction: constrained the success of the EA program) or morphogenetic (transformation/elaboration: enabled the success of the EA program). As explained by Archer (1995, p. 193): “the three [-stage MA cycle] are continuously operative in society and are always interrelated because they intersect in their middle element – since all generative mechanisms are only influential through people”. She stressed:

...the social system is open, open because peopled, and therefore of no fixed form due to human powers of unpredictable innovation”. Thus “...by examining the interplay within and between the three cycles, for the ultimate benefit of analytical dualism is that it is not a static method of differentiation but a tool for examining the dynamics by which the 'parts' and the 'people' shape and re-shape one another through their reciprocal interaction over time (p. 194).

Such a focus uncovered the key implementation mechanisms and social responses triggered by EA implementation that enabled and constrained the success of the program in the university sector, and University X in particular.

5.4 Research Design

5.4.1 Objective of the research

The main objective of this study was to understand people-focused mechanisms and their interplay between and within the structure, culture and agency (people), by building a theoretical explanation of the key role of people in EA implementation, most notably in the university sector. To understand how and why EA programs work or fail to work from a social perspective, four sub-research objectives were introduced (Figure 5.6) in order to:

1. Identify the situational mechanisms by which social structure conditions individuals' actions and how cultural environments shape their social situations;
2. Describe the interactive mechanisms linking the social situation (context) and people's personal concerns (people's thoughts and ideas that tend to consider themselves – their desires, beliefs, values, acquaintances and interests) to influence their actions;
3. Identify the cultural and structural dimensions of an action context, both how they shape and are shaped by groups of individuals; and
4. Specify the transformational mechanisms by which individuals, through their actions and interactions, generate various intended and unintended social outcomes.

Such an examination requires scrutiny beyond everyday events to uncover the deep causal mechanisms involved. MA emphasises the need for recognising structure, culture, and agency (SCA) over time; and the introduction of a temporal element placed the important macro-micro-macro mechanisms in context. Reflexivity theory (micro-micro context) was used to strengthen the study's objectives and outcomes. These foci provided direction for examining the interplay between the various mechanisms and their roles in structural/cultural change for understanding the research objectives.

5.4.2 Case selection

The case study was conducted in University X (for reasons of anonymity) – a large multi-campus institution serving local communities as well as a significant cohort of international students. The university recognised that its future depended on the institution's implementation of EA to deliver its mission and strategic priorities. Although the study

focused on a single case example, the adoption of a focus on mechanisms suggests the arguments can be applied more generally to other universities. As argued by Stake (1994, cited in Dobson, 2001b), this approach aligns with the argument that a case study is not a methodological choice, but a choice about the object to be studied.

Yin (2003, cited in Wynn & Williams, 2012, p. 9) also argued: "A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". Thus "a case study involves investigating one or a small number of social entities or situations about which data are collected using multiple sources of data" (Easton, 2010, cited in Wynn & Williams, 2012, p. 9).

As the main objective of the study was to gain understanding of the people-focused mechanisms in EA implementation and its interplay with social structure, culture and agency, Walsham's (1993, cited in Dobson, 2003) concept of in-depth case studies as the only means to understand human nature in context, was deemed appropriate. Similarly, Gustafsson (2017) stated: "A case study can be defined as an intensive study about a person, a group of people or a unit, which is aimed to generalize over several units (p. 2)". Thus, "Single case studies are better when the writer wants to create a high-quality theory because this type produces extra and better theory. A single case study also makes the writer to have a deeper understanding of the exploring subject. Other benefits are that single case studies richly can describe the existence of phenomenon and it is better to make a single case study than a multiple case study when the writer wants to study, for example, a person or a group of people (p. 11)".

In respect to the critical realist case study, Wynn and Williams (2012) stated: "...to uncover the causal mechanisms and contextual factors that combined to generate them, case study research is well-suited to conduct critical realist research" and "...the case study method is the best approach to explore the interaction of structure, events, actions, and context to identify and explicate causal mechanisms" (p. 9).

5.4.3 The case study

In the past two decades, the Australian higher education (university) sector has been operating in a climate of uncertainty and change in a move towards corporatisation, marketisation and rationalisation (Gengatharen et al., 2009). This has introduced unique challenges in the form of a complex reality of social interaction between organisational social structures, cultures and individuals. It is in this climate that University X (abbreviated as UX) adopted a “One-IT” approach to all its systems, requiring EA for implementation. UX’s current technology environment, built over many years and evolved in a random manner, had become increasingly complex, inflexible and difficult to manage. To deliver the required technology capability, UX tasked the Chief Information Officer (CIO) with responsibility for all of its IS, through the establishment, maintenance and custodianship of the architecture and governance structures.

Moreover, as stated by the CIO of UX, “global trends in higher education are resulting in pressure on IT to respond quickly to meet new expectations of students, staff and other stakeholders, whilst facing ever-increasing cost pressures. Therefore, the right EA implementation will enhance the customer experience, address the need to improve productivity and, at the same time, manage risk across UX. Since EA implementation at UX took a university-wide view, encompassing all aspects of IS including socio-cultural change within the university and all its complexity, UX needed a more adaptive EA that could translate strategic directives into actionable implementation aligned with its purpose, vision, values and goals. It will be interesting to examine the role of people’s reflexivity in the way programs impacted their ultimate decisions concerning EA implementation, and the effect this had on the structures, mechanisms and culture of UX.

It is widely known that the Australian education system has become a stand-out success as a service exporter over the past decades. Large numbers of overseas students are educated in Australia and many universities now rely on overseas markets for a large part of their revenue. The significant numbers of overseas students enrolled in Australian universities have led the Australian government to change its policies regarding the education system. One of the most significant changes was a requirement for education providers to record class attendance for international students undertaking certain levels of qualification, and to report on students

who had exceeded a threshold of allowable absences (Wright, 2013; DET, 2007). This means every university needs to provide data and information electronically, requiring IT standardisation.

The importance of EA implementation in universities is also reflected in the Council of Australian University Directors of IT (CAUDIT). CAUDIT has been the major sponsor of the EA Symposium in Higher Education since 2006. The CAUDIT Symposium brings together EA stakeholders from Australian and New Zealand higher-education institutions, and provides attendees with opportunities to: showcase and view good practice and progress in enterprise architecture in the higher education sector; gain a snapshot of enterprise architecture in Australasian higher education; share and debate tactics and programs that have proven to be effective; network with people sharing similar interests from different perspectives; and collaborate and support each other with respect to enterprise architecture into the future. This illustrates the value of EA implementation to universities (CAUDIT, 2013).

5.4.4 The target populations and participants

The population targeted by this study comprised EA stakeholders within UX. They included any person, group, organisation, member or system which affected or could be affected by EA implementation. Accordingly, this study proposed two forms of agency as the population target: a) people who affect and are affected by EA implementation – these people are referred to as the top-down population sample; and b) people who can be affected by the EA implementation – these people are referred to as the bottom-up sample.

Top-down participants are also referred to as EA management, whose institutional structures and positions range from involvement in the university IT Governance Committee, the University Architecture Board, and the Enterprise Business Group to Lead Enterprise Architect. Bottom-up participants are referred to as the end-users and include teaching staff, researchers, students, and administrative staff of the faculties, schools and service centres.

In alignment with Archer's MA, EA management participants were categorised as corporate agents and primary agents who affect and are affected by EA implementation, while the end-users were categorised as individual actors who are affected by EA implementation. Six participants from the EA management sample played a major role in the implementation, and

were selected for interview based on the level of dependence of their business unit on the university core systems, and more importantly, their role in EA implementation. Six participants were from the EA end-user, representing the UX environment, and were randomly selected for interview.

5.4.5 Materials, validity and reliability

The study used materials obtained from interviews, UX official documents, historical data, the UX IT masterplan and EA implementation program, materials posted on complementary websites, materials distributed at various meetings, presentation materials, and other material distributed via electronic mail, as well as scrutiny of other contemporaneous materials.

Careful consideration was given to issues of validity and reliability in the collection and analysis of the data to provide a CR view of causality. According to Johnston and Smith (2008) there are four principles of reliability for CR when discussing research validity:

1. CR allows a distinction between theory and the social mechanisms (causal influences) that the theory describes;
2. CR allows a distinction between social mechanisms and the particular events they cause in particular circumstances;
3. CR allows a distinction between the actual events we would like to explain and the empirical traces of these events that we can observe; and
4. In CR, theory testing shows that the generative mechanism is the theory that describes and produces the actual events and constitutes the research domain to which the theory applies.

Zachariadis, Scott and Barrett (2013, p. 858) compared different types of conventional validity with CR to provide a summary of the types of validity in CR qualitative research.

Table 5.1 Validity in qualitative research

(Adapted from Zachariadis et al., 2013, p. 860)

Validity Type	Conventional Description	Critical Realism
Design Validity	<i>Descriptive validity:</i> Accuracy of events, objects, behaviors, and settings reported	Explanations of mechanisms in action and the conditions with which they are interacting;
	<i>Credibility:</i> Results are believable from the participants of the research.	appreciation of the field by identifying, prioritizing, and scoping boundaries of the study.
	<i>Transferability:</i> Results can be generalized and transferred to other settings.	The idea that similar or related events that occur (or might occur) in other settings are caused by the generative mechanism that caused the actual events in the field.
Analytical Validity	<i>Theoretical validity:</i> Theoretical explanation developed fits the data.	Theory is used to help hypothesize about the mechanisms and provide explanations for the events that have occurred.
	<i>Dependability:</i> Researchers describe changes in the research setting and its effects on the research approach of the study.	This is an essential part of the retroductive process and identification of contingent factors.
	<i>Consistency:</i> Verifying the steps of qualitative research process.	Challenge and inform the terms of (quasi-) closure and process of ongoing inquiry in retroductive analysis.
	<i>Plausibility:</i> Findings of the study fit the data from which they are derived.	Whether data that is empirically available gives valid knowledge about the actual manifestation of the alleged generative mechanism in the field.

Validity Type	Conventional Description	Critical Realism
Inferential Validity	<i>Interpretive validity:</i> Interpretation of participants' views are accurate.	Findings from qualitative research can provide information about the mechanisms that cause the events at the empirical level.
	<i>Confirmability:</i> The results are confirmed by others.	

This study was guided by the principles of reliability and validity for CR-based studies as outlined above.

5.4.6 Data collection procedure: Interview and observation protocol

The data collection procedures emphasised the clarification of major EA events, UX's social structures (and cultures) and the contextual environment – the methodological principles of CR (Wynn & Williams, 2012). The explanation of major EA events was based on TOGAF high-level models (TOGAF, 2011) as UX's EA implementation was based on TOGAF (i.e. the architecture compliance models and its principles, the cross-organisational architecture governance, and the stakeholder management). It emphasised UX stakeholders at the time of EA implementation in the contextual environment, along with the relationships among them, and included details of the key actions and outcomes, and the specific structural and cultural components that were involved.

Firstly, with respect to architecture compliance models and its principles, this study set out to determine the involvement of the various “people” elements and associated mechanisms for conformance, and describe the action mechanisms and possible milestones to ensure compliance over the period of EA implementation. Secondly, from the perspective of cross-organisational architecture governance and stakeholder management, this study examined the structural and cultural readiness for adopting EA practices, reflected by the awareness of senior management involved.

However, these major EA events (TOGAF-based implementation) may only emphasise the powerful management elements or corporate agents with little attention on the affected stakeholders (primary agents and individual actors), which would therefore neglect the important actual events not recognised by TOGAF models. It was hoped that these “actual”

events or people-focused mechanisms would emerge to enhance our understanding of the evolution of important mechanisms. Wynn and Williams (2012, pp. 10-11) argued that the principle of explication of major events will “...describe the necessity to identify the detailed aspects of events being studied, usually through the abstraction of experiences, as the foundation of causal analysis (mechanisms).”

To identify the important mechanisms that could potentially evolve this study developed a causal, transitive explanation of the complex socio-technical system, through empirical observation, of the experiences perceived by UX stakeholders, together with the various outcomes identified and measured empirically. These observations were based mainly on casual conversations (interviews) with the two sample population groups: EA management and EA end-users, as mentioned in section 5.4.4 above.

The interview materials were divided in two. The first was for EA management participants, and the second, for EA end-users. Each consisted of two parts as follows:

1. The ‘in-depth’ interview (discussion/opinion questions).

Semi-structured in-depth interviews were used as the primary method of data collection for UX stakeholders. The questions were developed based on Archer’s MA (Archer, 1995; 1996) to identify the generative mechanisms hidden in the real domain, and to highlight the conditions that encourage individual and collective acceptance of EA practices.

Semi-structured interviews provided flexibility and allowed new questions to be raised during the interview as a result of what the interviewees said (Lindlof & Taylor, 2002). As suggested by Wynn and Williams (2012) “a primary objective of scientific research conducted under CR is to develop explanations for the way things act and how they are capable of so doing (p. 9).” Thus “in information systems, the greatest potential contribution of CR-based research comes from developing context-specific causal explanations of socio-technical phenomena by explicating the specific mechanisms which generate them (p. 9).” In addition, the interview questions emphasised the explication of major events amongst UX stakeholders at the time of EA implementation, based on TOGAF models (TOGAF, 2011). Examples of the interview questions for *EA management*^{5.1} and *EA end-users*^{5.2} can be seen in textboxes 5.1 and 5.2.

2. The 'internal conversation indicator' (ICONI).

ICONI (Archer, 2008) consists of thirteen items, assigning nearly all subjects unambiguously to a dominant mode of reflexivity. The aim of ICONI, as suggested by Archer (2008), is "...to identify clear practitioners of a dominant mode of reflexivity [as the mediatory mechanisms] for in-depth interviews" (p. 4).

According to Archer (2008), reflexivity is responsible for a) "...a subject's adoption of projects [or context], that is, courses of action intended to realise their personal concerns; b) for the reflexive mediation of structural and cultural properties that shape the situations (contexts) they confront, facilitating some actions and hindering others; and c) determining precisely what different subjects do with what intentions and with what consequences" (pp. 4-5). ICONI is divided into 3 parts:

- Part 1. Part 1. Sets the scene by comparing and contrasting "Reflexivity's Biographies" (examines the distinctive nature of internal conversation – the four dominant modes).
- Part 2. Outlines how different combinations of (natal) contexts and personal concerns hold the key to the dominant mode of reflexivity practiced, unrelated to gender or socio-economic background, though significantly correlated with length of education. Qualitative features of the natal background, summarised as contextual continuity, contextual discontinuity and contextual incongruity, were found to be related to the dominant practice of communicative, autonomous and meta-reflexivity respectively. This depended equally upon the concerns of the *Communicative* being capable of realisation within their natal context, those of the *Autonomous* being capable of fulfilment in a different but accessible context, and those of *Meta-reflexives* having the continuous promise of realisation in a succession of available contexts.
- Part 3. Uses life and work histories to show how *Communicatives* work at staying put, how *Autonomous* subjects are upward and outward bound, and how *Meta-reflexives* are continuously moving-on, thus generating their three characteristic patterns of social immobility, upward mobility and social volatility (Archer, 2008, p. 5).

This reflexivity indicator is useful in explaining how personal projects are formed and mediate the exercise of structural/cultural constraints and enablements within EA implementation. ICONI identifies how people subjectively define particular courses of action (personal concerns) in relation to their objective social circumstances (the context of EA) and explains how people's reflexives respond to the embedded mechanisms of EA implementation. *The 'internal conversation indicator' (ICONI)*^{5.3} and *Scoring Subjects on ICONI*^{5.4} can be seen in textboxes 5.3 and 5.4.

Box 5.1: Example of the interview questions for EA Management

Exploring 'people' as the key element in Enterprise Architecture implementation:

A critical realist perspective

Case study: University X

EA Management Participant Interview

Date:

... ..

Interviewee Code:

... ..

Participant background

1. No. of Years at UX:
 <2 2-4 5-10 11-15 >15
2. Office/Department:

3. Position in EA Management Team:

4. Role in EA Management Team:

Discussion/opinion questions:

1. UX expressed that new governance arrangements will play a key role in EA program. What do you feel are the main changes in your department as a consequent from new governance arrangements? How have these been accepted?
2. What do you see as the main risks in the EA implementation and associated governance? What major "people" impacts will these have? What challenges or concerns have you encountered?
3. The CIO expressed that there is a communication program in place to communicate the value of EA. How important do you see this? Do you think the acceptance of the stakeholders improved since the program started? From your point of view, are there any departments better or worse than others in accepting the changes? Do you think stakeholders are understanding the value of EA program better now? What do you see in stakeholder engagement so far?
4. How is the value of EA being communicated to prospective users?
5. Are there any local "politics" impacting the EA implementation from new governance arrangements? Do you find that individuals react to the changes differently? If so why do you think this is so and how is it demonstrated
6. New policy requirements from government continually impact the university sector. Do you see any particular governmental requirements/policy affecting the current EA arrangements significantly?
7. The CIO and Lead Architect see organisational culture as very important in EA success. Do you think UX culture is generally compatible with EA goals? How do you think UX culture will affect EA adoption? Do you think the "culture" of individual departments make adoption more difficult?
8. What would you define as a successful EA implementation? What can be done to encourage the adoption of EA at UX?
9. Is there anything else that has come to mind as we talked today that you would like to add?

N.B.:

The interview questions will be slightly different for each to appreciate the nature of semi-structured in-depth interviews: allow new questions to be brought up during the interview as a result of what the interviewee says

MA Time: T¹ to T⁴



Box 5.3: ICONI (Archer, 2008)

PART 1:

Some of us are aware that we are having a conversation with ourselves, silently in our heads. We might just call this 'thinking things over'. Is this the case for you?

	YES <input type="checkbox"/>				NO <input type="checkbox"/>		
ON THE WHOLE							Strongly Disagree
	Strongly Agree						
	7	6	5	4	3	2	1
1. I do daydream about winning the lottery.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I think about work a great deal, even when I am away from it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I dwell long and hard on moral questions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I blot difficulties out of my mind, rather than trying to think them through.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. My only reason for wanting to work is to be able to pay for the things that matter to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Being decisive does not come easily to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I try to live up to an ideal, even if it costs me a lot to do so.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. When I consider my problems, I just get overwhelmed by emotion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. So long as I know those I care about are OK, nothing else really matters to me at all.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I just dither, because nothing I do can really make a difference to how things turn out.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. I'm dissatisfied with myself and my way of life - both could be better than they are.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. I know that I should play an active role in reducing social injustice.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I feel helpless and powerless to deal with my problems, however hard I try to sort them out.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PART 2:

X. In general, what are the three most important areas of your life now - those that you care about deeply? (Please give the most important first).

1. _____
2. _____
3. _____

PART 3:

Y. Your (current or last) occupation _____

Z. Age _____ Gender _____

Box 5.4: Scoring Subjects on ICONI (Archer, 2008)

Part 1:

1. The questions are divided into 4 categories, that is there are 3 questions indicative of 'Communicative reflexivity', 3 questions indicative of 'Autonomous reflexivity', 3 questions indicative of 'Meta-reflexivity and 4 questions indicative of 'Fractured reflexivity'.
2. The scores for the four modes of reflexivity are calculated as follows:
 - Communicative reflexive score = $(Q1 + Q5 + Q9)/3$
 - Autonomous reflexive score = $(Q2 + Q6^* + Q11^*)/3 \rightarrow (* = \text{inverted})$
N.B. Please note carefully that for Question 6 and Question 11, the numerical scores should be INVERTED when calculating an individual's score.
 - Meta-reflexive score = $(Q3 + Q7 + Q12)/3$
 - Fractured reflexive score = $(Q4 + Q8 + Q10 + Q13)/4$

Modes of reflexivity:

- Communicative reflexives: whose internal conversations need completion and confirmation by others before leading to action.
 - Autonomous reflexives: who complete their internal deliberations alone and act upon them.
 - Meta-reflexives: who scrutinize and criticize their own inner dialogues, their chosen actions and their social contexts.
 - Fractured reflexives: who are (temporarily) unable to conduct purposeful self-talk but, instead, augment their own distress and disorientation
3. A score of 4 and above on any of the four categories of questions assigns a subject to the C, A, M, F category, as their dominant mode of reflexivity - whichever is their highest score over 4.
 4. F scores of over 4 are held to 'trump' other scores. Such subjects are registered as 'F' regardless of their other scores - even if these are higher.

Part 2:

5. Question 'X' is an open-ended question about subjects' ultimate concerns:

Reflexivity Concerns:

- "C" concerns: interpersonal relationship with family and friends
- "A" concerns: work, career, performative achievements, financial success
- "M" concerns: intrinsic interests, socio-ethical pre-occupations, spiritually
- "F" concerns: resolving problems, establish a better way of life, overcoming present difficulties

Part 3:

6. In addition, the background data collected used in order to test for statistical association between the EA management participants and the EA end-users' participants.

Even though ICONI uses numeric scoring subjects, it is not registered in standard quantitative studies, since ICONI qualitatively integrates people's subjective course of action (personal concerns) and objective social circumstances (personal context) in a workable method of operation that can be considered as the living link between structure and agency. Archer (2008) suggested:

Particularly interesting is the fact that many of the trajectories of mobility documented here would not have registered as such in standard quantitative studies because they entailed small but very tenacious occupational shifts. Thus, the aim was accomplished of contributing to a theory of social stratification that gives due weight to both its voluntary and involuntary aspects, which intersect through the medium of the internal conversation (pp. 3 – 4).

Another essential point is that passive observations were undertaken in regular EA meetings at UX, and this was triangulated with secondary data collected as per section 5.4.5 above. These observations were useful to: a) examine how EA management participants (the corporate and primary agents who affect and are affected by EA implementation) communicate with each other; b) check definitions of terms that participants use; c) identify how things are organised and prioritised; d) identify how people interrelate, and e) grasp the cultural parameters (i.e. leadership, politics, social interaction) (Kawulich, 2005).

Interview questions and protocols were constructed to unearth perceived causal inferences, while the direct observations covered contextual events in real time (Johansson, 2005). All data were classified according to Archer's MA tool, and all data sets were stored and coded using qualitative software tools (Nvivo10, 2012).

The results of the data collected from the study were critically redescribed from people's viewpoints into theoretical perspectives (see 5.4.7 Analysis Methods). Explanations of events (usually from experiences) identified them as a foundation for understanding the underlying phenomena. Next, the explication of structure, culture and context identified the components of social reality, along with agency relationships (Wynn & Williams, 2012, p. 10).

5.4.7 Data analysis and its methods

Data analysis identified the fundamental properties and tendencies of structural and cultural entities to do certain things, and their relationships, which through a process of abstraction combined to produce the emergent properties of the structure and culture as a whole. The abstraction can be extended by redescribing the component parts of structures and cultures, and their relationships, in terms of existing theories and frameworks to provide leverage for potential explanation (Wynn & Williams, 2012).

To appreciate the methodological framework of the study in providing a CR ontological view between causal explanatory analyses and mechanism-based explanation, in other words between concrete and abstract activities, the analysis was undertaken in five stages: a) description; b) analytical resolution; c) abduction; d) retroduction; and e) comparison with different abstractions/theories.

1. Description: The explanatory social science analysis

Description is the first stage in the analysis process of describing EA phenomena. The analysis focused on the empirical domain to obtain knowledge of the empirical facts related to major EA events at UX which are directly or indirectly observable. In terms of direct observation, the empirical evidence was analysed qualitatively using the stakeholders' interpretations and perceptions (primary data: interviews). Indirect observation comprised a review of archival data (secondary data: ranging from the theoretical/existing research to UX's official EA documents). The interpretations of the people involved in EA events and their way of describing the current situation (primary data) together with the secondary data were grouped into TOGAF high-level models to describe the often complex and composite EA events. Coupled with review of archival data, these stakeholders' interpretations and perceptions are what this research study refers to as ***empirical facts***.

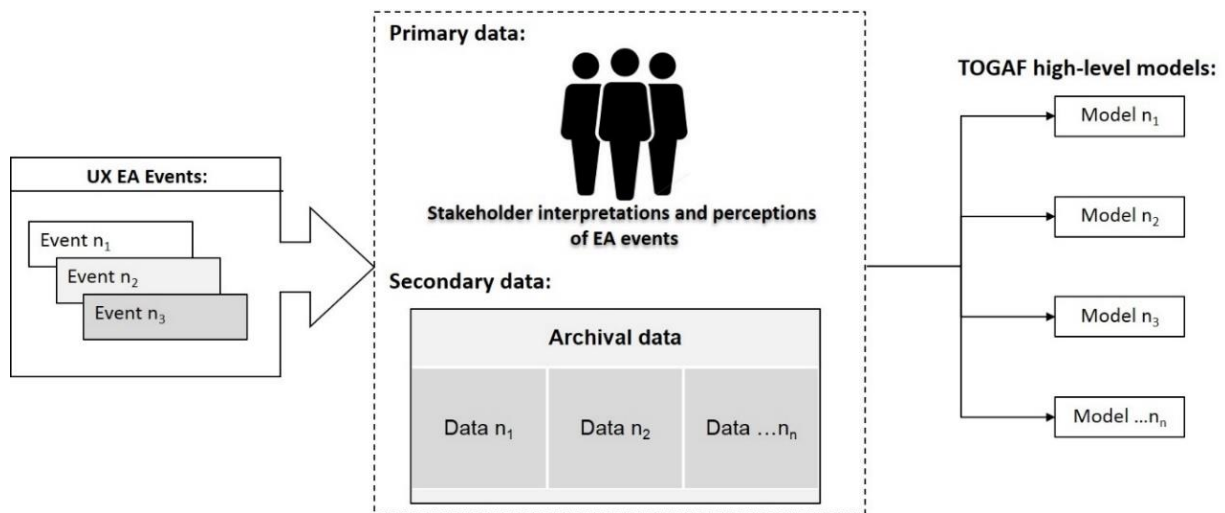


Figure 5.7: Mapping the empirical facts of EA events

2. Morphogenetic approach as an analytical tool in ‘analytical resolution’ stage

The empirical facts gathered and described in the first stage of this study were analysed using the morphogenetic approach (MA) in an attempt to identify the interplay between cultures, structures and agency over the time of EA implementation. This determined two important relationships: a) the relationship between a time prior to EA implementation and the time of EA implementation (the first- and second-order emergent properties) (see Figure 5.8); and b) the interplay between and within social structures, cultures and agency at the time of EA implementation (second-order emergent properties) (see Figure 5.9). This evaluated the so-called analytical histories of emergence (Archer, 1995). The following discussion explains how MA is perceived as an analytical tool to uncover important mechanisms hidden in the real domain.

Time prior to the EA implementation

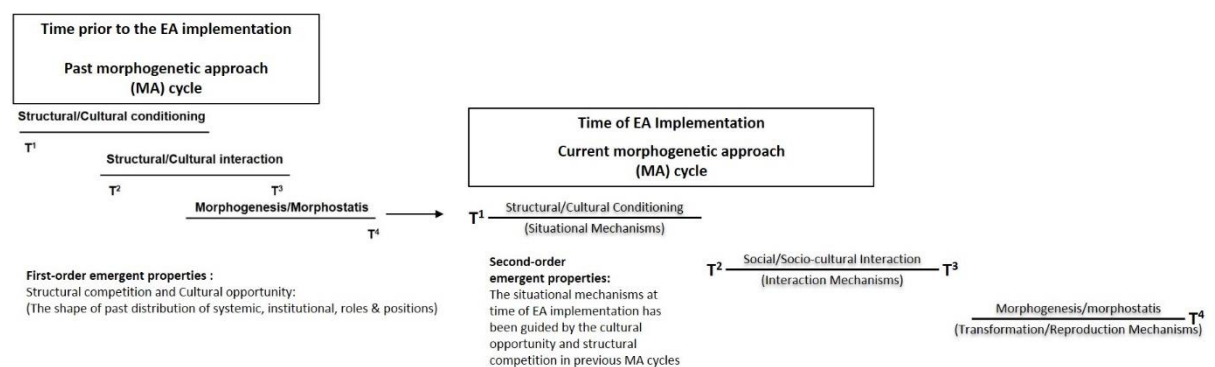


Figure 5.8: The analytical histories of emergence

Figure 5.8 above describes the relationship between a time prior to EA implementation and the time of EA implementation (the first- and second-order emergent properties). In other words, the study identified the kinds of mechanisms involved in structural and cultural transformation and reproduction in previous MA cycles (prior to EA implementation). This analytical history of previous MA cycles is important in describing and identifying the situational mechanisms within the structure and culture in the second emergent property (time of EA implementation). The situational mechanisms at the time of EA implementation were guided by the cultural opportunities and structural competition in previous MA cycles (Archer, 1995, 2015).

Time of the EA implementation

Figure 5.9 represents the second-order emergent properties of the MA cycle, whereby this study attempted to uncover important mechanisms and social responses hidden in the real domain. MA allowed for deep examination of the key implementation mechanisms resultant from the tendency powers of generative mechanisms and the social processes that drive such large-scale architectural transformation in the university sector, and in UX in particular.

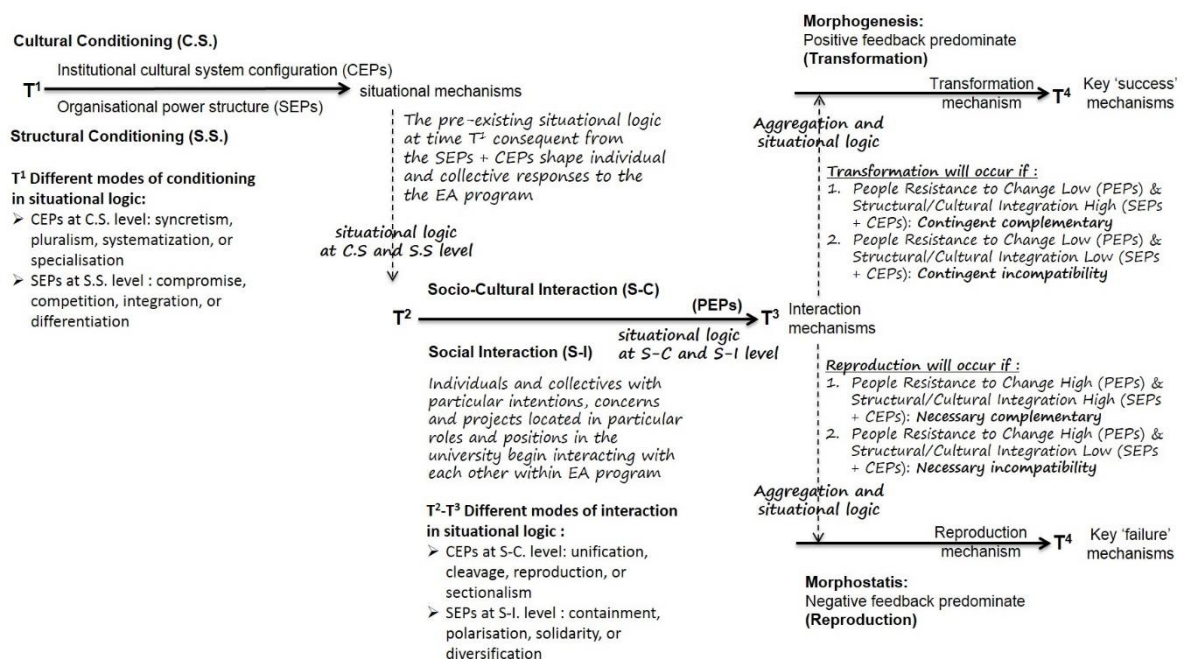


Figure 5.9: Second order emergent properties of MA cycles

Figure 5.9 above shows different SEPs and CEPs existed at Time 1 (T^1). These emergent organisational properties or powers of the structural system (SS) and cultural system (CS) define different modes of conditioning in situational logics, which predispose agents towards specific courses of action to promote their own interests. The different modes of conditioning in situational logics represent possible situational mechanisms (generative mechanisms) that shape people's opportunities and orientations. A stratified model of people (PEPs) helped define how the EA program engaged with the levels in different ways. Analysis at T^1 identified the situational mechanisms by which social structures constrained individuals' actions and cultural environments shaped their desires.

From Time 2 (T^2) to Time 3 (T^3), examination of social and socio-cultural interaction (SI/SC) occurred to understand how the different strata pursued different courses of action within the EA program. During the interaction stage, people developed their PEPs based on: a) the alternatives available to the people involved; b) the restrictions that governed the choice of alternatives; and c) their evaluation of the possible consequences of their choice (Archer, 2010a). SI/SC interactions were viewed as being structurally conditioned but not structurally determined, and agents themselves were seen to possess their own irreducible emergent powers. The different modes of interaction in situational logics represent the possible interaction mechanisms (generative mechanisms) that shaped individuals' and collectives' action with regard to EA implementation. Individuals and collectives with particular intentions, concerns and projects located in particular roles and positions in the university began interacting with each other. Examination of T^2 to T^3 constructively describes: a) the interaction mechanisms linking the social situation (context) and the personal concerns of agents (concerns: individuals' desires, beliefs, etc.,) to their actions; and b) identifies the cultural and structural dimensions of an action context, both shape and are shaped by groups of individuals.

At Time 4 (T^4) and as described by Lockett (2012, p. 324), analytical histories of particular contexts are required to explain the outcomes of social interaction which may involve structural and cultural change [morphogenesis: when the majority of the university environment adopts the EA program, positive feedback predominates to elaborate or

change the social system's given form/structure] or reproduction [morphostatis: when the majority of the university environment rejects the EA program this is governed fundamentally by negative feedback, thus preserving the social system's given form/structure]. Detailed explanations in regard to the occurrence of morphogenesis or morphostatis can be seen in Figure 5.10. The T⁴ outcomes specify the transformational (or reproductive) mechanisms by which individuals, through their actions and interactions, generate various intended and unintended social outcomes.

In addition to the research objectives above, the results of Archer's MA are also expected to: a) identify any socio-cultural change that could result from some autonomous processes operating at the structural level; b) identify social activities between people (micro), who represent UX stakeholders, and the organisational (macro) features of systems are either reproduced or transformed; c) explain how organisational agents or actors react to the EA implementation; d) identify the key implementation mechanisms and social responses triggered by EA implementation in the university sector and UX in particular.

Morphostatis or morphogenesis?

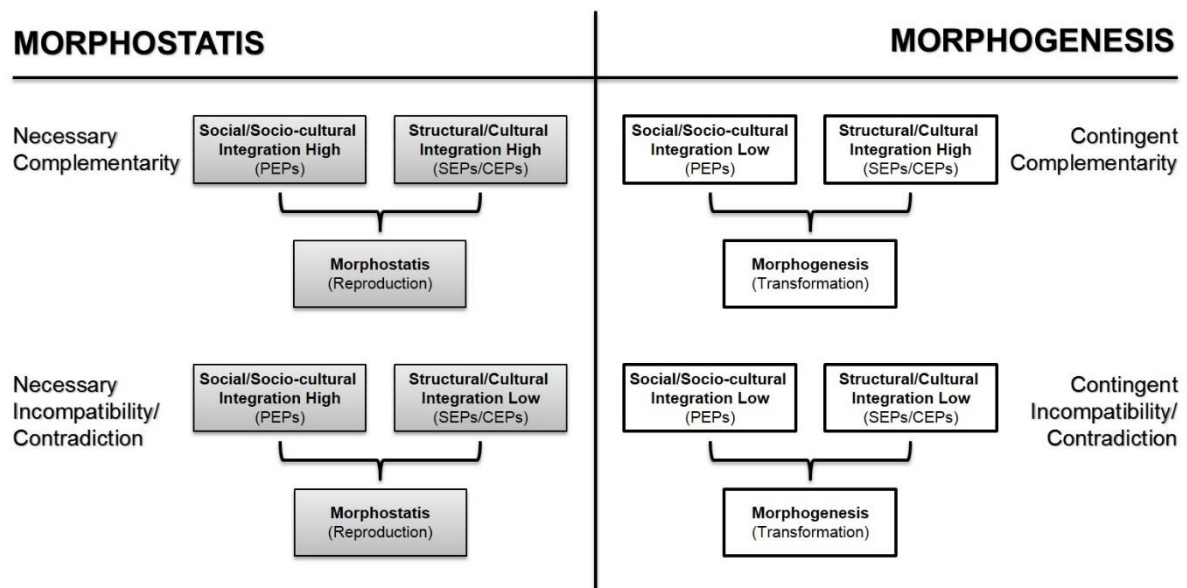


Figure 5.10: The interplay between and within structures, cultures and agency

Figure 5.10 illustrates the occurrence of Morphogenesis and Morphostatis. According to Archer (1995; 1996), the social or sociocultural integration consists of people emergent

properties (PEPs), while the structural/cultural integration consists of structural- and cultural emergent properties (SEPs and CEPs). In other words, the social or socio-cultural integration describes the level of people's tendency in response to social change, while the structural and cultural integration describes the level of an organisation's tendency with regard to social change.

Transformation will occur if people foster values of social reorientation, which can predominate the existing social system towards social transformation. Where adoption of the EA program by the majority of the university environment is characterised by positive feedback, this is known as **Morphogenesis**:

- People's resistance to change is Low (PEPs: social or sociocultural integration) & structural and cultural integration is High (SEPs and CEPs): referred to as **contingent complementary** (Archer 1995; 1996).
- People's resistance to change is Low (PEPs: social or sociocultural integration) & structural and cultural integration is Low (SEPs and CEPs): referred to as **contingent incompatibility** (Archer 1995; 1996).

Reproduction will occur if people are reluctant to change, whereby the existing social system remains unchanged. Social reproduction occurs when the majority of the university environment rejects the EA program, characterised by negative feedback and known as **Morphostatis**:

- People's resistance to change is High (PEPs: social or sociocultural integration) & structural and cultural integration is High (SEPs and CEPs): referred to as **necessary complementary** (Archer 1995; 1996).
- People's resistance to change is High (PEPs: social or sociocultural integration) & structural and cultural integration is Low (SEPs and CEPs): referred to as **necessary incompatibility** (Archer 1995; 1996).

3. Abduction: Theoretical redescription/recontextualisation

Danermark et al. (2002) described abduction, or theoretical redescription or recontextualisation thus:

...to observe, describe, interpret and explain something within the frame of a new context, [as] a central element in scientific practice.” [...] “The revolution of recontextualizations is that they give a new meaning to already known phenomena [or event]. Social science discoveries are to a large extent associated with recontextualization. Social scientists do not discover new events that nobody knew about before. What is discovered is connections and relations, not directly observable, by which we can understand and explain already known occurrences in a novel way (p. 91).

Danermark et al. (2002) emphasised that the various events in the empirical domain can be part of and explained in relation to structures, cultures, internal relationships and contexts which are not directly observable in the real domain. This is what these authors called *abduction* – a theoretical redescription or recontextualisation whereby the original conceptual framework or theory of an object under study, is placed in a new context of ideas. Abduction is to move from the original concept of something to a different, possibly better developed, deeper concept.

Umberto Eco (1984, cited in Danermark et al., 2002, p. 93) distinguished between three different types of abduction: a) overcoded; b) undercoded; and c) creative abduction. *Overcoded abduction* is a mode of inference characterised by uncontrived naturalness. It is a matter of spontaneous interpretations which are made from an innate cultural and social prejudging. *Undercoded abduction* implies a choice from a number of possible frames of interpretations or theories. *Creative abduction* is characterised by uniqueness and innovation. In the context of social science, it is a form of creative abduction when a researcher observes something from a frame of interpretation that nobody has used before, or which at least opposes conventional interpretations.

In view of the above it can be concluded that if an EA event has been identified in the empirical domain as a theoretical explanation in the real domain, then the results will lead us to a new supposition about the perceived or unperceived event in the actual domain. Therefore, in this study, abduction is used to seek connections or relations, not directly observable, between the EA events (in the empirical domain) and the identified EA context (mechanisms and situational logics in the real domain – MA). This gives new meaning to already known EA events by identifying the events and non-events in the

actual domain. The type of abduction used in this study is creative abduction. Figure 5.11 depicts the interconnections of EA events and contexts located in the actual domain (not directly observable) that generated the already known EA events (the observable EA events in the empirical domain).

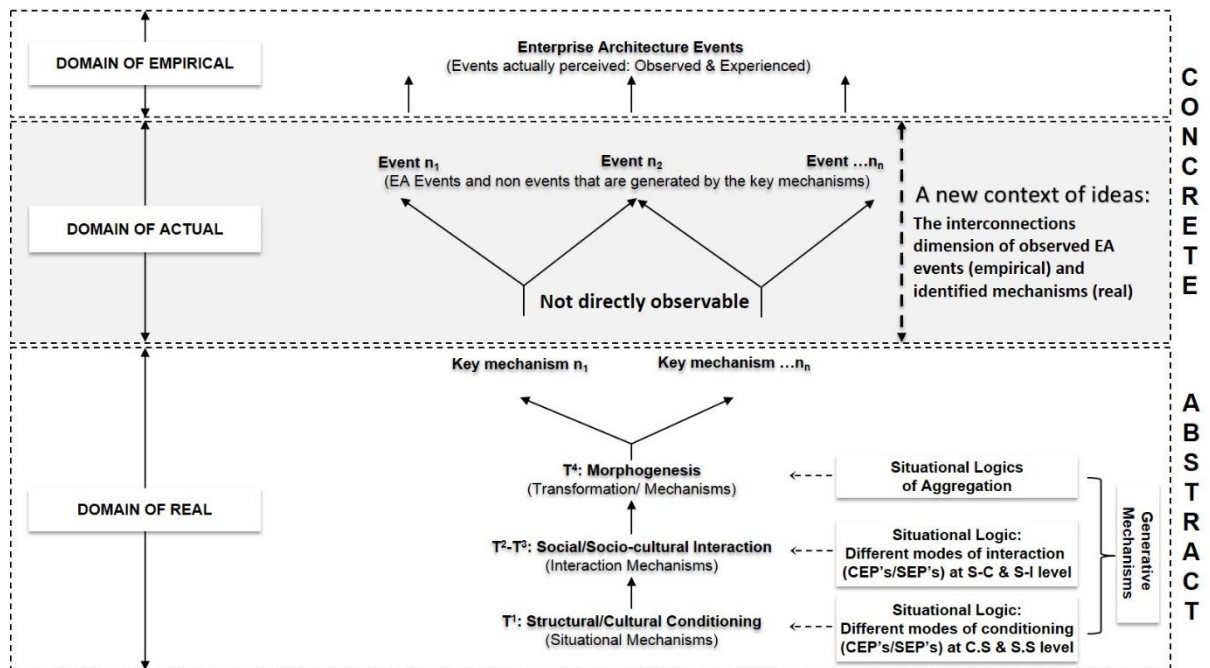


Figure 5.11: 'Abduction' process

4. Retroduction: The transcendental argumentation

According to Danermark et al. (2002, p. 96), the core of retroduction is transcendental argumentation:

...to clarify the basic prerequisites or conditions for social relationships, people's actions, reasoning and knowledge. The term 'conditions' here means the circumstances without which something can't exist.

The essential characteristic of retroduction is its capability to provide knowledge of transfactual conditions, which can be identified by going beyond something that can be observed and experienced. As suggested by Danermark et al. (2002):

...realist metatheory emphasizes the difference between observable events [in the domain of empirical] and the domains of structure and mechanisms [domain of real]. Social reality consists of structures and internally related

objects containing causally operating properties. Knowledge of this social reality can only be attained if we go beyond what is empirically observable [beyond the domain of empirical] by asking questions about and developing concepts of the more fundamental, transfactual conditions for the events and phenomena under study. Retroduction is about advancing from one thing (empirical observation of events) and arriving at something different (a conceptualization of transfactual conditions) (p. 96).

EA implementation programs can be extremely hard to manage, not only in terms of the architecture implementation itself, but also in terms of buy-in from large numbers of stakeholders. EA programs contain a powerful set of mechanisms for social change with people (stakeholders) at its heart. This study placed mechanisms at the centre of its investigation and required identification of people's responses to the mechanisms that encouraged individual and collective acceptance of EA practices. These people responses, which cannot easily be seen, can be explained through retroduction, which examines "what is basically characteristic and constitutive (that is, people's internal relations) of people in adopting the EA". While this study was able to obtain the required data in regard to people's interpretations and perceptions of EA adoption, the internal relations of EA adoption were still not known. Within its conceptualisation of transfactual conditions retroduction regards people as relational, which means this stage can reconstruct people's internal relations towards adopting the EA. In identifying people's internal relations it was also necessary to identify the basic conditions for people's social relationships, including the mechanisms identified (that is, the people-focused mechanisms in MA), their reasoning and knowledge.

To clarify, these basic conditions are not directly observable within EA implementation. Retroduction, also known as transfactual argumentation (Danermark et al., 2002), goes beyond the empirical (something that can be observed and experienced). Reflexivity theory was adopted in this stage (Archer, 2008; 2010a; 2010b; 2013b – see Chapter 4) as:

...the responses of individuals are obviously extremely diversified because of their different modes and degrees of reflexivity. Social processes carry out the selection of the influence exercised by individuals on the basis of their different capacities and objective opportunities for responding with suitable

reflexivity to the challenge of having to find a relation appropriate to themselves and their world (Donati, cited in Archer, 2015, p. 70).

People's internal relations can be described by using reflexivity theory's "internal conversations" to identify how they subjectively define particular courses of action (personal concerns) in relation to their objective social circumstances (context of EA). This is done by means of the reflexivity investigation tool, the ICONI. These "internal conversations" explain how people respond to embedded mechanisms (interaction mechanisms). Questions can also be answered by attempting to reconstruct people's reflexive deliberation (internal conversations), thereby forming an important mechanism for explaining how structures and cultures constrain and enable agents (reflexive mediation of mechanisms). As suggested by Archer (2008; 2010a; 2014), the significance of the distinctive modes of reflexivity lies in their different relationships to structural and cultural constraints and enablements. To elaborate, Archer (2008) identified that:

[The] *Communicative reflexives* work at remaining embedded in their original social 'context' by evading both the objective costs that would be incurred by resisting constraints and repudiating the objective bonuses associated with enablements. They do so in order to promote family well-being, which usually entails occupational self-sacrifice on their part. *Autonomous reflexives* adopt a strategic stance towards constraints and enablements, fallibly seeking to avoid society's 'snakes' and to ride its 'ladders'. They progress up the occupational hierarchy through self-disciplined dedication to work and subordination of all other relationships to this 'ultimate concern'. *Meta-reflexives* are subversive towards constraints and enablements because they are willing to pay the price of the former and to forfeit the benefits of the latter in attempting to live out their vocational concerns. All of the above are active agents who succeed in achieving some governance over their own lives, in contrast to *Fractured reflexives* who are (temporarily) passive agents to whom things happen (p. 5).

These modes of reflexivity can be useful in detecting the implicit knowledge of various people's internal relations with regard to structural and cultural constraints and enablements (the social tendency power, the situational logics and its generative mechanisms):

- ***Communicative reflexives*** are extroverted chatterers [...] whose internal conversations are almost immediately relayed by interpersonal ones. They think and talk. [...] they are in fact [medians] who mistrust their lone internal conversations and turn to significant others in their immediate environment to talk things through and dialogically resolve their questions. Their priorities are clear; what they care most about is [...] family and friends. [...]. Shunning objective enablements to social advancement, all of them reproduced their familial backgrounds and showed contentment with their lot. [They] are guided by [the] traditional action [...] (Vandenberghe, 2008, p.7). In terms of structural and cultural constraints and enablements (Archer, 1995; 1996), the social tendency of communicative reflexives is guided by *morphostatis* (Archer, 2008; 2010a), as they tend to reproduce the current social system (reluctant to change). The institutional configuration of social responses of morphostatis is either *necessary complementary* or *necessary incompatibility* (Archer, 1995; 1996) which leads to *reproduction mechanisms* (see Table 4.3) and situational logics (see Figure 4.8) of *protection* or *correction*. From an EA adoption point of view, communicative reflexives will likely reject the EA program as they are fundamentally governed by the situational logic of *protection*. From the situational logic of *correction* they tend to refine the EA target to reproduce the current social system that also negatively affects the EA program.
- ***Autonomous reflexives*** are lone thinkers [...] with independent minds whose internal reflections are primarily goal-oriented. They think and act. Work seems to be their primary concern and, unlike communicative

reflexives, they subordinate their interpersonal relations to work and are not afraid to move away from their initial context. In fact, it appears that, early on in [...] life, they had articulated life projects [personal concerns] that burst the bounds of their social environment [personal context: e.g. the EA program]. Keen to act on social enablements, they also know how to circumvent anticipated constraints to accomplish their own ends. [The autonomous] invest their lives in performative accomplishments and [their] instrumental [...] actions benefit the system and strengthen the integration of its components (Vandenberghe, 2008, p.7). From a structural and cultural constraints and enablements (Archer, 1995; 1996) point of view, the social tendency of autonomous reflexives is guided by *morphogenesis* (Archer, 2008; 2010a), as they tend to foster values of social reorientation which can predominate the existing social system towards social transformation. The institutional configuration of social responses of morphogenesis is either *contingent complementary* or *contingent incompatibility* (Archer, 1995; 1996) which leads to transformation mechanisms (see Table 4.3) and situational logics (see Figure 4.8) of *opportunism* or *elimination*. In terms of EA adoption, autonomous reflexives are likely to use the *opportunity* mechanism to gain more flexible architecture and an open architecture solution to the EA program (opportunism situational logic), while from a situational logic of *elimination* autonomous reflexives tend to eliminate the functional areas that do not align with the EA program to meet the organisation goals.

- ***Meta-reflexives*** are idealists who critically reflect on their reflections (hence “meta”) and seem genuinely concerned about their concerns, which don’t quite mesh with their ultimate concern and which they cannot dovetail to their own satisfaction. They think and think. Their internal conversation is directed towards [them] selves. Preoccupied with their selves [...], they seek self-knowledge and practice self-critique for the sake of self-improvement and self-realization. Driven by a personal

mission, they also criticize their environment and find [it] invariably wanting. As no available context ever satisfies their requirements, they are contextually unsettled and continuously on the move (even across continents), searching for a new job, a new career, a new life, a new self. As they cannot be bought off by inducements and are willing to pay the price of downwards mobility to realize their ideals, they are immune to constraints and enablements (Vandenberghe, 2008, p.7). Meta-reflexives are unique as their social stratification can be social immobility, upward mobility or even social volatility (Archer, 2008; 2010a). Unlike communicatives and autonomous reflexives, the social tendency of meta-reflexives within structure and culture could be guided by *morphogenesis* if they foster values for social re-orientation and develop organisations that gesture towards social transformation (high morphogenesis and low morphostatis: Archer, 2008; 2010a) or by *morphostatis* if they are willing to pay the price of the constraints and forfeit the benefits of the enablements in attempting to live out their vocational concerns (high morphostatis and low morphogenesis: Archer, 2008; 2010a). The institutional configuration of social responses and situational logics depends on the personal mission (or project) which can generate the *transformation* or *reproduction* mechanism (Archer, 2008; 2010a). In terms of EA adoption, they can be adopters if the program does not directly impact the way they do things (the necessary conditions that encourage people's acceptance of EA practices) or non-adopters if they see the EA program negatively impacting their personal mission (conditions that discourage people's acceptance of EA practices).

- **Fractured reflexives** are individuals with broken lives whose powers of reflexivity have been either temporarily suspended as they are moving from one mode of reflexivity to another or even impeded all together, [...]. Either way, reflexivity does not work for them. The more they think and talk to themselves, the more they get emotionally distressed and cognitively disorientated. Unlike [other] reflexives, fractured reflexives

have no real [personal concerns] and no strict personal [context] either. As their internal deliberations, do [not] allow them to deal successfully with their situations, they are passive agents who are at the mercy of their social environment, which affects them from without as a pseudo-natural one. [...] Alienated and reified into things, they are [...] people to [whom] things simply happen (Vandenberghe, 2008, p.7). In terms of structural and cultural constraints and enablements (Archer, 1995; 1996), the social tendency of fractured reflexives is undefined (Archer, 2008; 2010a) as it could be *morphogenesis* or *morphostatis* since they have no real personal mission (or project). In resolving problems or overcoming difficulties, fractured reflexives find themselves on the side of the majority to establish a better way of life (Archer, 2008; 2010a). In terms of EA adoption, fractured reflexives become adopters if most of their colleagues adopt the EA program and vice versa.

Table 5.2 below provides a summary of the basic conditions for reflexivity (people's internal relations) to link with generative mechanisms and situational logics resulting from MA analyses. The table provides an important overview of how to link people's context and personal concerns with the generative mechanisms and social situations, both theoretical (abstract activities in the real domain) and empirical (concrete activities in the empirical domain: i.e. the in-depth interview data and ICONI scoring). Such a table can provide evidence of how personal projects are formed (basic condition of reflexivity) and how they mediate structural and cultural constraints and enablements (reflexive mediation of mechanisms).

Table 5.2 Basic conditions of people reflexivity, generative mechanisms and situational logics

(Adapted from Archer, 1995; 1996; 2008; 2010a; 2013a; 2015)

Basic conditions of people reflexivity						Tendency power	Generative mechanism: The modes of conditioning and interaction in situational logics	Situational Logic
Mode of reflexivity	Reflexivity of personal concern ('concern')	Qualitative feature of social situational ('context')	Social stratification	Relationship to structural: constraints and enablements	Reflexive mediation of mechanisms: The modes of reflexivity for social order			
Communicative reflexives	Interpersonal relationship with family and friends	Contextual continuity	Social Immobility	Resisting constraints and repudiating the objective bonuses associated with enablements	Invest themselves in the family, thus making a huge contribution to social cohesion and to intergenerational solidarity through the dense micro-worlds they sustain	Morphostatis	CEP's C.S: Syncretism S-C: Unification SEP's S.S: Compromise S-I: Containment	Correction
							CEP's C.S: Systematization S-C: Reproduction SEP's S.S: Integration S-I: Solidarity	Protection
Autonomous reflexives	Work, career, performative achievements, financial success	Contextual discontinuity	Upward mobility	Adopt a strategic stance towards constraints and enablements	Devote themselves strenuously to the market and contribute most to economic growth and development	Morphogenesis	CEP's C.S: Pluralism S-C: Cleavage SEP's S.S: Competition S-I: Polarisation	Elimination
							CEP's C.S: Specialization S-C: Sectionalism SEP's S.S: Differentiation S-I: Diversification	Opportunism

Basic conditions of people reflexivity						Tendency power	Generative mechanism: The modes of conditioning and interaction in situational logics	Situational Logic
Mode of reflexivity	Reflexivity of personal concern ('concern')	Qualitative feature of social situational ('context')	Social stratification	Relationship to structural: constraints and enablements	Reflexive mediation of mechanisms: The modes of reflexivity for social order			
Meta-reflexives	Intrinsic interests, socio-ethical pre-occupations, spiritually	Contextual incongruity	a) Social immobility b) Upward mobility c) Social volatility	Subversive towards constraints and enablements	a) Foster values for social re-orientation and develop organizations that gesture towards social transformation	High Morphogenesis Low Morphostatis	CEP's C.S: Pluralism S-C: Cleavage SEP's S.S: Competition S-I: Polarisation	Elimination
							CEP's C.S: Specialization S-C: Sectionalism SEP's S.S: Differentiation S-I: Diversification	Opportunism
					b) Willing to pay the price of the constraints and to forfeit the benefits of the enablements in attempting to live out their vocational concerns	High Morphostatis Low Morphogenesis	CEP's C.S: Syncretism S-C: Unification SEP's S.S: Compromise S-I: Containment	Correction
							CEP's C.S: Systematization S-C: Reproduction SEP's S.S: Integration S-I: Solidarity	Protection
Fractured reflexives	Resolving problems, establish a better way of life,	Undefined qualitative feature: have no real projects	Undefined social stratification	(Temporarily) passive agents to whom things happen	Passive – no action: who are at the mercy of their social environment	Could be Morphostatis or Morphogenesis	No specific generative mechanisms: Depending on the interplay situation between the systemic	No specific situational logics: Depending on

Basic conditions of people reflexivity						Tendency power	Generative mechanism: The modes of conditioning and interaction in situational logics	Situational Logic
Mode of reflexivity	Reflexivity of personal concern ('concern')	Qualitative feature of social situational ('context')	Social stratification	Relationship to structural: constraints and enablements	Reflexive mediation of mechanisms: The modes of reflexivity for social order			
	overcoming present difficulties but their internal deliberations do not allow them to deal successfully with their situations						integration (SEP's + CEP'S) and the social integration (PEP's) in the organisation under study.	the interplay situation between the systemic integration (SEP's + CEP'S) and the social integration (PEP's) in the organisation under study

5. Comparison with different abstractions stage: An understanding of the EA implementation phenomena through abstractions/theories

As discussed above, the final stage of analysis is expected to elaborate and estimate the relative merits of each abstraction/theory in explaining the observed happenings: "...the relative explanatory power of the mechanisms and structures [and cultures] which have been described by means of abduction and retroduction within the frame of stages three and four [in the methodological framework of the study]" (See Figure 4.3) (Danermark et al., 2002, p. 110).

Danermark et al. (2002) concluded:

Abduction can be redescribing and giving meaning to events, taking one's starting point in a theory, a coherent system of ideas or concepts. Through retroduction, concepts and theories are developed which can provide answers to such questions as: What characteristics make X what X is? (p. 120).

Importantly, Danermark et al. (2002) suggested theories are abstractions and indispensable when it comes to explanation, since they conceptualise causal mechanisms. Therefore, the main objective of this stage (see Figures 5.3; 5.4) was to bring the theory of the program mechanisms to the fore, which had been found in the empirical domain (description stage) to determine the conditions under which the program theory might support: a) the social mechanisms that generated the events and non-events; and b) to support the people-focused mechanisms (reflexive mediation of mechanisms) in underpinning the stakeholders' interactions.

Pawson and Tilley (1997) proposed an important focus on understanding the nature of programs and how they work. They concluded programs are "... theories, they are embedded, they are active, and they are parts of open systems (p. 3). These authors also identified mechanisms as a basic concept in explaining and understanding programs:

Mechanisms describe what it is about programmes and interventions that bring about any effects. Mechanisms are often hidden, rather as the workings of a clock cannot be seen but drive the patterned movements of

the hands. This realist concept tries to break the lazy linguistic habit of basing evaluation on the question of whether 'programmes work'. In fact, it is not programmes that work but the resources they offer to enable their subjects to make them work. This process of how subjects interpret and act upon the intervention stratagem is known as the programme 'mechanism' and it is the pivot around which realist research revolves. Realist evaluation begins with the researcher positing the potential processes through which a programme may work as a prelude to testing them.

Based on Pawson and Tilley's (1997) description, this study defined program mechanisms, as discussed in section 1.1 – Chapter 1, as the underlying entities and processes which operate in the context of success in EA implementation programs to generate outcomes of interest in respect of architecture transformation. Thus, program mechanisms are the EA theories underlying the implementation, and can also be referred to as the embedded EA theories built into the EA implementation program (see Chapter 2 for a list of program mechanisms identified in EA theory). Understanding the theory underlying program implementation is therefore helpful in deriving the mechanisms by which architecture transformation is achieved or not.

The relative merits of each EA theory (abstraction) also provides an important overview of the relationship between theory (abstraction, i.e. the social mechanisms) and observation/data (concrete, i.e. the ICONI – reflexive mediation of mechanisms) in studies with a CR foundation. Danermark et al. (2002) suggested:

We can never understand, analyse or categorize reality without using a theoretical language of concepts. (p. 116)" Thus "What is important is that we conceptualize events, mechanisms and internal relations in a certain way, with the help of theories. Conceptualizing is the same thing as abstracting and isolating fundamental qualities [...]. The concepts provide an abstract language enabling us to speak about qualitative properties, structures [and cultures] and mechanisms (p. 120).

Equally important, Danermark et al. (2002) argued:

To a large extent the objects of social science are such social situations, relations, processes and structures that never appear as given facts or as something directly observable. Social relations and structures can only be understood by means of concepts. It is a fairly common notion that our knowledge increases primarily through data collection and surveys. With Bhaskar's terminology we can say that such a notion is based on a double reduction. Our knowledge of social reality is reduced to knowledge of events, which in turn is reduced to empirical observations of these events (p. 117).

5.5 Limitations

As with most research projects, this study also has its limitations. These are associated with the characteristics of the research approach that might impact or influence the interpretation of the findings. The following limitations are acknowledged:

1. In regard to the research approach, the methodological principles of CR require that: "...explanation via mechanisms must specify the [structural] powers and [cultural] propensities of that particular mechanism and identify the [people] causal tendencies produced by it" (Archer, 2015, p. 53). As a result, those methodological processes will require the researcher to formulate a new idea about the interconnection of the EA phenomena resulting from the theories (abstraction) and the empirical case under study (concrete). In view of the time limit for completion of this study this may not be fully realised. However, it was anticipated that a new concept, resulting from the research methodology and findings, will provide a unique opportunity for proposing amendments to existing EA methodologies and frameworks to more clearly reflect the critical role of people in the change process of EA implementation.
2. Given that CR is particularly useful for examining the social aspects of the environment in which IS resides (Mingers, 2004; Wynn & Williams, 2008; Dobson, 2009; Bygstad & Munkvold, 2011; Carlsson, 2011), the technical aspects of IS could be considered not to have significant benefits. Nonetheless, as EA is a means of enabling informed decision-

making in IT-business transformation as well as ensuring compliance with EA governance (decisions made), viewing EA as a social program will reduce ineffective EA implementation with regard to the technical aspects of IS – the non-technical aspects will affect the technical aspects. Fundamentally EA provides the contextual influences of real-world social complexity surrounding the architecture, and CR can increase our understanding of causal mechanisms and contexts needed to achieve positive outcomes in EA implementation.

3. The limited sample size may make it difficult to identify significant relationships from the data, since samples normally require larger numbers to ensure representative distribution of the population. Nevertheless, sample size is less relevant in qualitative research – as Morse (2000) suggests, there are no specific rules when determining an appropriate sample size in qualitative research, and qualitative sample size may best be determined by the time allotted, resources available, and study objectives (Patton, 1990). This qualitative study used semi-structured, in-depth interviews with a case study to emphasise the need for understanding human nature in the social context of EA implementation. It was designed to identify the important mechanisms hidden in the real domain and highlight the conditions that encourage individual and collective acceptance of EA practices.
4. Finally, due to the difficulty of engaging an organisation that is implementing EA as a condition for investigating EA implementation, this study was limited to a single organisation case study. However, it was anticipated that the rich data obtained from this study would be useful to other researchers seeking to develop a better understanding of people as a key element in EA implementation, particularly in the higher education sector.

5.6 Ethical Considerations

This study was guided by the “Australian Code for the Responsible Conduct of Research” with regard to the ethical oversight of research involving humans: National Statement on Ethical Conduct in Human Research (2007) - Updated May 2015. Semi-structured, in-depth interviews were conducted to gain an understanding of how organisational stakeholders affect and are affected by EA implementation. It was essential to obtain genuine opinions,

even if they were opposed to the EA program. The following statements and ethical guidelines were contained in the information letter to participants in order to gain their trust and confidence for revealing their true opinions:

1. **Potential Harms/Benefits:** There are no identifiable risks associated with participation in this research. The benefits to participants are to gain a deeper knowledge related to the people roles of EA, along with a greater understanding of the dynamics of the complex social situation surrounding the architectural program. The researcher will share with the participants the deep understanding and recommendations as to the possible mechanisms that most likely lead to desirable outcomes. The sharing of academic knowledge should assist the organisation to achieve greater positive outcomes. The results are also expected to be applicable to other organisations in different disciplines within Australian universities and elsewhere.
2. **Participation:** Participation is completely voluntary. Confidential interviews should take about one hour, at a location convenient to the participant. The interview questions were provided before the interview was conducted. Participants were free to ask questions and review their answers. Also, the decision to participate was not binding, and participants could withdraw at any time and end the meeting without reason and without negative consequences. Participants could request copies of the written paper for their own purposes if so desired.
3. **Confidentiality:** Participants and his/her organisation were not able to be identified individually so that responses remained anonymous. The interviews were recorded for the purpose of transcribing the content. Transcripts were provided to the participants upon request. Any recording stored on computer has been protected by password. The researcher will erase digital recordings when all the reports for the research have been accepted. All written notes by the researcher were immediately coded in order to protect the participants' personal information. Notes and transcripts have been stored in a locked cabinet at the researcher's university. The data may also be shared with the researcher's supervisors who are guiding the work of the student. Any information or details given for this study will be kept confidential, will be used for the purposes of this research, and may be used in related future research. If a participant has any concerns or complaints about the research project and wishes to talk to an independent person, they

were provided with the contact details of the Research Ethics Officer at the researcher's university.

4. **Consent:** Consent related to making an informed, voluntary decision to participate was sought from individuals participating in the study. By signing the letter of consent as a participant and acknowledging that he/she had read and understood the information, consent to participate in the research was obtained with the proviso that he/she could withdraw at any time.

5.7 Summary

This chapter focused on the research approach for investigating social mechanisms in EA implementation. The study used realism, particularly CR, as the underlying philosophy to investigate the social responses triggered by EA implementation that constrained or enabled the success of the EA program in the university environment, thus providing an account of how the underlying mechanisms work. Such an investigation requires a focus beyond everyday events to uncover the deep causal mechanisms involved. Given the nature of the explanatory context in identifying the mechanisms, the research approach required a definition that treats mechanisms as ontological in its methodological framework (Archer, 2015). Danermark et al.'s (2002) model of explanatory research, based on CR, was adopted as a framework to guide the investigation into mechanisms. The framework allowed the researcher iterative movement between the concrete activities (the empirical and actual domains) and the abstract activities of the real social world (the generative mechanisms hidden in the real domain that generated the key implementation mechanisms) in order to explain the observed events.

Within this framework the research design used Archer's MA (Archer, 1995; 1996; 2013a; 2015) as a useful tool for theorising and examining EA implementation and to identify the generative mechanisms and its key implementation mechanisms. Archer's reflexivity theory (Archer, 2003; 2008; 2010a; 2010b; 2013b) was adopted to identify how people subjectively define particular courses of action (personal concerns) in relation to their objective social circumstances (their context of EA). The data collection was mainly guided by Archer's MA and reflexivity theory to identify the important mechanisms hidden in the real domain and highlight the conditions that encourage individual and collective acceptance of EA practices.

Although this study involved a single case example, the focus on mechanisms allows the arguments to be extended more generally to other universities.

The central theme of the research design formed an important link between the technological and social phenomena in the study and CR as the underlying philosophy. The following chapter presents the detailed findings of the contextual success mechanisms identified from the case study, along with a discussion of the potential consequences of mechanisms in different time settings (prior to EA implementation and at the time of EA implementation) within the university under study. The theoretical and practical implications identified from the case study are also explained and illustrated.

CHAPTER SIX: CASE STUDY, DATA ANALYSIS AND RESEARCH FINDINGS

6.1 Overview

This chapter presents the data analysis and research findings from the enterprise architecture (EA) implementation at University X (UX). An analysis of the abstract and the concrete in providing a critical realist (CR) ontological view of causal and mechanism-based explanations is provided. A *brief summary of UX EA Program*^{6.1} from initiation to implementation is also described. The findings are presented in three sections (see Figure 6.1). The first section discusses the EA events already experienced by the UX community (people); i.e. the empirical facts in *the empirical domain*. This domain encompasses EA events that are perceived or experienced directly or indirectly.

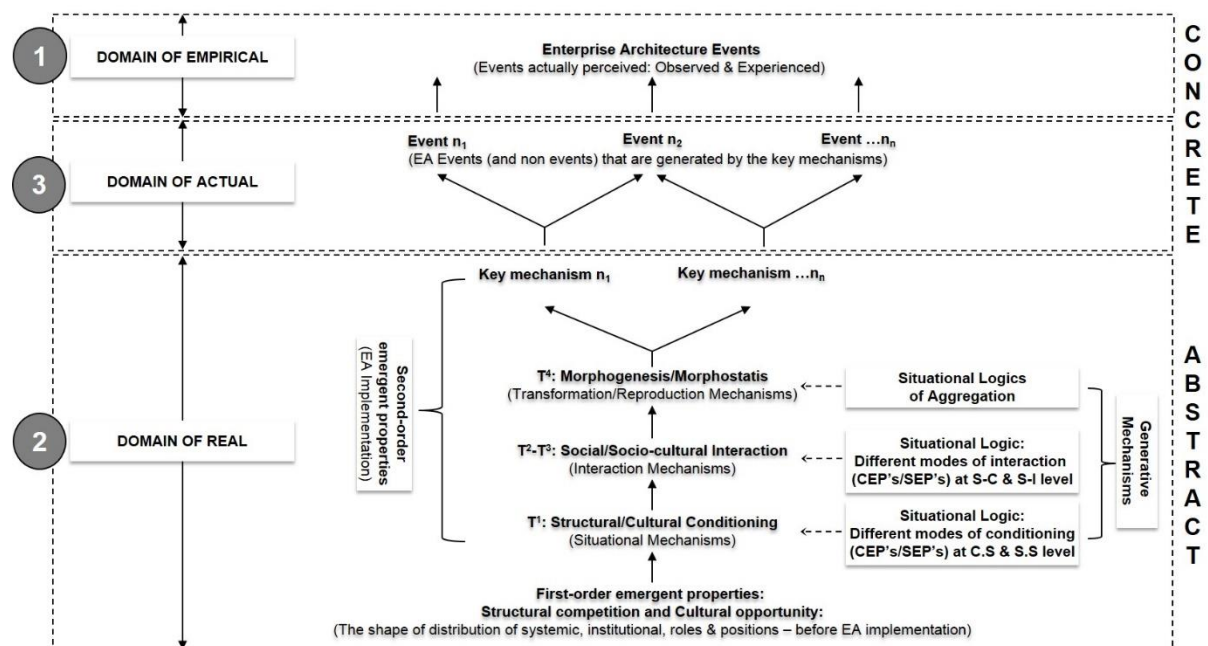


Figure 6.1: The ontological map

The following sections discuss *the real domain* and identify the hidden mechanisms and social responses (the situational logics of structure and culture) that endure the potential powers and properties activated by people's actions and triggered by EA implementation. It is in this domain that mechanisms are identified. When mechanisms produce factual EA

events and non-events they fall into *the actual domain*, whether people experience them or not. This domain describes how each mechanism has fundamental implications for how EA implementation generates perceived or unperceived EA events.

Box 6.1: UX EA Program: Initiation to Implementation (2012 – 2016)

Background:

The current technology environment at the UX has been built over many years and evolved in an unplanned manner. It has become increasingly complex, difficult to manage and inflexible. The IT complexity problems mainly stems from: a) silo-based organisational partitions in the IT investment; b) complex business operations arising from the inherent complexity of business itself; c) global emphasis – changes in technology and HE trends; d) no architectural initiatives – leading to improvisation instead of following an architecture roadmap; and e) poor governance and decision making due to locally organised IT governance.

The executive decision:

In August 2012, the board of university executive had decided that governance structures and a new enterprise architecture (EA) program will play a key role in delivery of IT at UX in future. The program will take a university-wide view encompassing all aspects of IT including people, processes and technology. Since then the EA program was developed and, at the end of June 2013 the planned EA strategy and governance was implemented.

The executive direction for EA program:

In early 2014, a Steering Committee, chaired by a high ranking UX executive, appointed various Enterprise Business Groups (EBGs) to represent different cross-sections of Faculties, Schools and Service Centres to reflect those centres expected to play a key part in the EA program. Subsequently, a UX IT Governance Committee (ITGC) was also formed and chaired by the Chief Information Officer (CIO). This was then followed by the establishment of the University Architecture Board (UAB). The objective of each EBG is to make certain that initiatives for the relative business area have sound business oversight and follow appropriate UX wide technology governance requirements. The EBG meeting frequency was to be determined by the volume of work and projects, and reporting requirements to the ITGC. The objective of the ITGC is to ensure that the University wide compliance to technology governance principles was addressed in a structured manner with recommendations made to the university are based on sound governance practices that have been designed to deliver the University's objectives for Information Technology. The role of the UAB is to make sure UX wide compliance to the UX enterprise architecture and roadmap and to make recommendations to the EBG on technology investments.

Since mid-2014, the EBGs, ITGC, and UAB have played an important role incross-organisational strategy and IT governance. For instance, the EA program can oversee implementation and obtain appropriate political backing, focusing on the rights, roles, and equitable treatment of shareholders, the program can also identify those investments that best support the achievement of UX's strategic goals.

6.2 Domain of Empirical

The empirical domain incorporates the empirical facts of EA implementation events which are directly or indirectly observable. The empirical facts were obtained from:

1. Primary data (directly observable – interviews): Interpretations of the people involved in EA events and their descriptions of the current situation. Six participants from the EA management sample played a major role in the implementation, and were selected for interview based on the level of dependence of their business unit on the university core systems, and more importantly, their role in EA implementation (referred to as the corporate and primary agents who affect and are affected by EA implementation). Six participants from the EA end-user, representing the UX environment, were randomly selected for interview (referred to as the individual actors), see section 5.4.4.
2. Secondary data (indirectly observable):
 - a) A review of archival data. Materials obtained from UX official documents, historical data, the UX IT masterplan and EA implementation program, materials posted on complementary websites, materials distributed at various meetings, presentation materials, and other material distributed via electronic mail, as well as scrutiny of other contemporaneous materials, see section 5.4.5.
 - b) Passive observations in regular EA meetings. These observations were useful to: examine how EA management participants (the corporate and primary agents who affect and are affected by EA implementation) communicate with each other; check definitions of terms that participants use; identify how things are organised and prioritised; identify how people interrelate, and grasp the cultural parameters (i.e. leadership, politics, social interaction) (Kawulich, 2005), see section 5.4.6.

These primary and secondary data were grouped into TOGAF high-level models to describe the complex and composite EA events (see Figure 5.7). Members of the corporate groups (the corporate agents: members of the university's IT Governance Committee, University Architecture Board, and Enterprise Business Groups) (see Chapter 5) emphasised the importance of TOGAF high-level models within the UX EA implementation program:

Corporate agent A^{6.2}:

We probably don't dive down sometimes to as low a level as what TOGAF in a purist form would do, but we sometimes keep it upper level [TOGAF high-level models] because we think that's as far as we need to go. You know we're not doing software development; we're outsourcing our infrastructure development and all of that sort of stuff, so there's some things where we don't need to go down as low level. We focused more on the "principles" around TOGAF than all the diagrams and all the... we'll do that when we need to. For example, in research administration we've mapped their processes. The next piece of work is data modelling in their area and we're getting a lot of resistance there because they don't see the benefit of that. So now we've got to explain to them "well, you've got research administration systems now and when you need to do your 'compliance' reporting and all of that sort of thing there's about three months of work for about five people to do this because you're not even capturing half the data". And that's why data modelling is very important. So we'll go down to where we need to go down to, to do what we need to do, and a data model for research administration has definitely got to be done because their lack of understanding... they'll want to go and buy this system without any thought to the day-to-day need to capture and the processes they need to support.

Box 6.2: Interview Quotation

The interview quotations are used to add analytical depth to the data analysis and findings: i.e. the roles and the original descriptive phrases highlight the subject discussed and provide support and credibility.

Corporate agent B:

TOGAF is a very good... well it's the primary-used EA framework. It's quite pragmatic which suits me down to a tee. From our perspective we're still very early on in our maturity, so we're adopting components of TOGAF that make sense [TOGAF high-level models], primarily from the artefact repository, so where it makes sense we're utilising those things.

One of the principles around TOGAF is tailoring TOGAF to make sense, so if it doesn't make sense for the organisational level of importance it puts on communication, then if you're applying TOGAF correctly, you should be modifying it or adapting that process to make sense of your organisation.

The technical jargon of things like TOGAF throwing out about particular artefacts [low-level models], you know, it doesn't help the situation when you're calling things and you think IT acronyms or you think techno jargon to explain stuff – the biggest barrier is actually technology in itself and the way that we as technology professionals communicate. A lot of the stuff that we've been trying to do within our team is trying to avoid utilising catalogue items that make those statements, so firstly we're talking about current state. Don't worry about a particular TOGAF artefact, it talks about process flow or whatever else, we're talking quite simply about documenting how you do things currently. It's taking the technology jargon out [low-level models], I think personally.

Data analysis and findings:

Four major EA implementation events, based on TOGAF high-level models, describe the important category of mechanisms underlying successful large-scale architecture transformation in the university sector (see Figure 5.7), the particular events within each overall category are listed below each category:

1. Events related to the architecture compliance:

- a) Service Level Agreements (SLAs) – to ensure support of the IT services (operational systems) of the university's functional areas at desired service levels.

- b) Operational Level Agreements (OLAs) – to ensure all architecture artefacts, contracts, and principles of the university’s functional areas are at desired operational levels.
- c) Technology standards catalogue – to ensure the application portfolio of the university’s functional areas are in place to gain a baseline view of EA compliance and technology standards. These standards are justifiably credited with reducing the university’s cost, enhancing technological interoperability and leveraging innovation.
- d) Communication guidelines – to support effective communication and decision-making, and manage the execution of communication between the EA program and stakeholders, and between the EA program and the consumers of its services (the university’s functional areas).
- e) Regulatory – the university’s decisions with regard to the EA program, such as which IT policies are negotiable and which must be enforced for regulatory or statutory reasons.

2. Events related to the architecture principles:

- a) Events that govern the architecture process, affect implementation and use of the EA.
- b) Events that govern implementation of the architecture, establishing the first tenets and related guidance for designing and developing information systems.

3. Events related to the cross-organisational architecture governance: Events that oversee implementation and obtain appropriate political backing, focusing on the rights, roles, and equitable treatment of shareholders. These events produce several outcomes related to the Strategic EA Governance Process (see Figure 6.2) which encompass all areas of UX and support the strategic, operational and technical decision-making processes required to ensure IT enables the university to deliver its objectives. The Strategic EA Governance process outlines the decision-making rights and controls that take place between formulation of the business concept and decision-making to fund and initiate the work as a project. These events are part of the EA collaboration program.

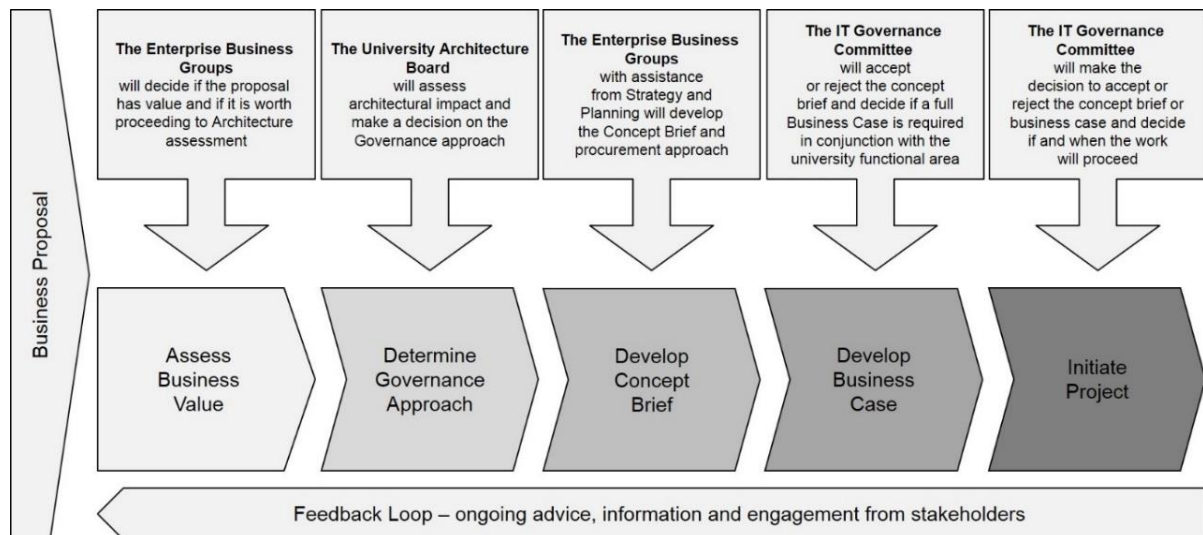


Figure 6.2: The University cross-organisational architecture governance

4. Events related to the EA roadshows and workshops for the university community:

These events are part of the EA communication program to explain the architecture roadmaps and strategies to the university community. They are a key part of EA implementation designed to:

- establish a fact base and prepare the university for the Future Scenario Workshops,
- communicate issues to and from the program, and
- be actively involved in analysis and design of program outcomes

In brief, these four major categories of EA implementation events were guided by the EA communication and collaboration program led by university executives. The next section goes deeper to explain the reality of related objects, their powers and mechanisms, such objects often not directly observable within the empirical domain.

6.3 Domain of Real

The real domain is the deep dimension where explanation is sought to explain university X's (UX) social structure and cultural influences (the generative powers of SEPs and CEPs - see Chapter 4) and how they are mediated by people shaping the situations (the situational logics) in which they subjectively choose particular courses of action in relation to their objective social circumstances. In other words, this domain is where generative mechanisms that enable the success of the EA implementation (often not directly observable) are to be found.

In order to identify these generative mechanisms an analysis was undertaken in four stages (see Figure 5.5, Chapter 5): a) analytical resolution; b) abduction; c) retroduction; and d) a comparison of different abstractions/theories.

6.3.1 Analytical resolution stage

Using Archer's morphogenetic approach (MA), empirical material gathered (see chapter 5) was elaborated and analysed in terms of the three defined part cycles (periods of time), each with relative autonomy yet interacting with each other. In terms of the MA, this analysis, also called the analytical histories of emergence (Archer, 1995) is designed to uncover: a) the relationship between a time prior to EA implementation and the time of EA implementation (the first- and second-order emergent properties; see Chapter 4); and b) the interplay between and within social structures, culture and agency at the time of EA implementation (second-order emergent properties).

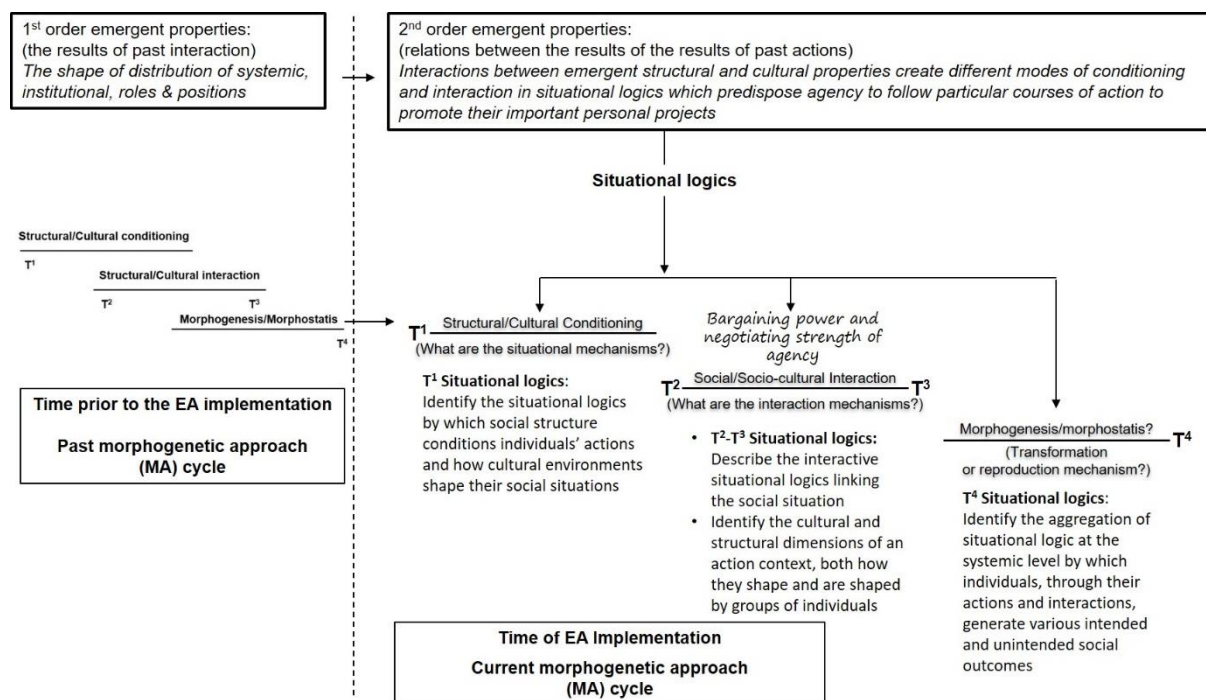


Figure 6.3: The analytical resolution stage

Data analysis and findings:

This subsection presents the analysis of the data and discusses the research findings, based on the research method and theoretical framework that have been outlined earlier in the thesis (see Chapter 5). The subsection also provides the supporting evidence (data: interviews quotation) for building greater credibility of the findings.

1. Time prior to EA implementation: First-order emergent properties

University X (UX) is a young Australian public university formed from an amalgamation of Australian colleges, with over a hundred years of experience in higher education. As a young modern university, almost thirty years after amalgamation, UX possesses a unique cultural and social structure. Its history shows UX demonstrates openness and tolerance towards cultural and structural changes, as indicated by a member of the corporate group:

A university is a university and we all do similar things, but I think the implementation's very likely to be different, and I think that's because of the cultural aspects. And [University X] has a very different culture to some of the more traditional universities – we're much more ready to look holistically at our business model rather than have different parts of the University look at just their bit. I'm not saying that that's not a problem, it still is a problem here, but it's much less of a problem than it is at other universities. And if we look at say [for example, the University Y], one of the sandstone universities, there's a lot of tradition in those universities as to how things are done and a lot less willingness to change the way things are done. What I can see of [UX], it's an extremely adaptive university and I think that's a lot to do with the youth at the University. It's a young university who just doesn't have that hundreds of years of tradition and I think the culture in the University is very different to some of those types of universities.

From a critical realist viewpoint, amalgamation of Australian colleges into a university (UX) created the necessary conditions for transforming the social system into a higher order, based on the need for a sustainable future. This first social-system transformation

at UX is what Archer called the first morphogenesis (1995; 2015), or the first structural and cultural transformation within the MA cycle – the first-order emergent property. First-order relationships determine the potential bargaining power of primary agent collectivities (members of UX business units/functional areas that are also members of UX Enterprise Business Groups - see Chapter 5) on second-order emergent properties.

2. Time of EA implementation: Second-order emergent properties

In the decades after its formation university stakeholders have gradually adopted various socio-cultural practices (habitual actions, established routines, traditional preserves or conventional divisions of activities). With the commencement of the EA program implementation, many of the established forms of socio-cultural practices are threatened, owing to the fact that EA is widely regarded as the starting point for a significant process of change. To some university stakeholders the EA program also meant that UX's business units and functional areas (faculties, schools, and service centres) may lose discretion over core business processes, even over the people and systems that execute them. Some of the primary agents articulated the main changes impacting their departments as a consequence of EA implementation thus:

Primary agent A:

...I guess at UX, instead of everyone managing their own IT like we've been doing, it's really to put it together as a corporate framework and a corporate process. I'm very much in favour of that and why I say that is I think we had [xxx, number of] people who really didn't have a career path because they just looked after our systems, so where do they go after that? So I actually lost the money for that and the money went across to IT department and it went into the bigger pool. Now I probably lost some level of service and everyone says 'we need our own resources' ...

Primary agent B:

I had one committee called ['z' committee] which was the [Department of X Systems Reference Group] – a committee that came together and we talked

to the library and included IT and all the service centres, to talk about IT and governance. Now that committee which was called ['z' committee], looks like it probably will no longer have a role because that role really has been superseded by [the IT Governance Committee, the Enterprise Business Groups, and the University Architecture Board]. So that would be one of the first things. The second major change from my perspective as well is that everyone really now needs to think very long-term. People can no longer say 'oh, I just need this little tweak done to my system in order to make an improvement' because that's not really feasible anymore. So people [from UX Business Unit] now have to fill out the forms that are submitted to the [University Architecture Board], [...], if I may be perfectly honest, [...] any programs which come through [my department], improvements around IT, [the Enterprise Business Groups] then just get slotted into the full list of all of the IT opportunities. And so while something may come through [my department] as being extremely important, must be done now, category five rating, in the overall scheme of things the big [Enterprise Business Groups], the top governance, they might say 'well no, we need to do these other things first'. So the changes then really are about [the 'z' committee], having to think long-term and realising that while we see something as a priority, potentially the University might not see it as a priority.

Another primary agent indicated the main risks of EA implementation impacting the associated governance as follows:

Primary agent C:

I think when you get complexity and lack of understanding [of EA program] you get all sorts of people feeling 'I don't trust this, I don't...' You know, you have a lack of acceptance by the business in there. And also too, a lot of it's not visible and therefore it's technical as well as being invisible, and people are just innately suspicious and therefore hostile to what these things are.

Consistent with these arguments, a corporate group member indicated:

... [Some people] are possibly the ones that have the most to lose out of enterprise architecture. Maybe previously they had a bit more free rein to spend their IT budget on the things they thought were the most important, which wouldn't necessarily be the things that will deliver the most value to the University or didn't align with the strategic direction of the University, whereas now they might view it as an enterprise architecture roadmap for their business area or it might constrain what they would want to do because it would give the University reason to say 'no, you can't invest in that because it's not on your roadmap'.

Nevertheless, the empirical domain shows that the EA implementation, after 4 years, finally achieved what was expected without significant difficulties in transitioning the IT architecture. One corporate group member indicated the current status of the EA implementation:

...we've certainly got our critical strategies in place and the roadmaps for our critical systems in place. We have an application portfolio management piece that's been done, so that we know with our existing applications whether we're going to maintain them, enhance them, retire them, whatever we're going to do. [...] ...it's to the stage we can say that all of the enterprise architecture work [has] been done...

What was not known were the key implementation mechanisms and social responses triggered by EA implementation that enabled the success of the program at University X. Using Archer's MA as the main defining tool, this study tried to find the important mechanisms and social responses in the real domain. The following discussion describes how MA supports findings related to second-order emergent properties (at the time of EA implementation) and helps explain the key mechanisms and social responses that propelled architectural transformation in UX (see Figure 5.8 in Chapter 5).

Time 1: Modes of conditioning of the cultural system (CS):

Macro (cultural) - Micro (people) context of cultural system

Analytical history^{6.3} of cultural system:

Time 1 is the initial stage of EA implementation at UX (see Figure 6.3) when modes of conditioning in the cultural system predisposed agents' (people) to use IT for promoting their important projects. An analytical history shows that in the past, an agreement was made with the university stakeholders whereby the university's functional areas have the freedom to organise their own IT environment in the way most suited to their natural competence, capability, skill, and qualification in respect of their specific business unit activities. Each business unit or functional area (faculties, schools, and service centres) has been shaped by cultural opportunities as a result of past socio-cultural interaction (previous MA cycle outcomes: first-order emergent properties).

Box 6.3: Analytical History

The features of analytical history are strategically important to provide the history of emergence within which particular situations (situational logics) can occur. The analytical history can help to explain the nature of the situations and how they affect conduct. As explained by Archer (1995, p. 167): "Since the existence of effects cannot serve to explain origins (a prime error of functionalism) then the task of social theory cannot be restricted to the mere identification of social structures [and cultures] as emergent properties, it must also supply an analytical history of their emergence which accounts for why matters are so and not otherwise. Equally, once they are so, they constitute part of the social environment, and, as with any other environmental influence, we can neither assume that agents are determined by them nor are immune from them, but can only examine the interplay between the powers of the two". Thus: "The end-point and the whole point of examining any particular cycle is that we will then have provided an analytical history of emergence of the problematic properties under investigation" (p. 91).

A report from UX's EA project team reveals: "Over the years, technology use within [UX] seems to have stagnated to the use of data defined by the functional area that consumes the data produced by the provision of the service. ...Most of the [IT] services provided at the university are determined by the university functional areas responsible for the service provided. Most of the [IT] services were manual in nature." Another EA report revealed that most of the IT products and services in UX functional areas focused on **specializations** to suit their own interests rather than university-wide interests.

Information gathered from UX's EA project team indicated the cultural milieu at Time 1 was characterised by a silo approach to IT. For instance: a) there were more than 200 unregistered applications/technologies in use by business areas to support their specific business functions; b) business processes were not end-to-end within the university; c) there was limited use of common technologies, e.g. no collaboration with other business units; and d) user experiences were inconsistent, i.e. there was no single vision for all students' interactions with the university to deliver a consistent experience.

A member of the corporate group indicated that IT products and services, at the initial stage of EA implementation, were defined by the respective functional area:

There certainly is politics between the service centres and the academics, so [called] general and academic staff areas. Again, I think in the past, certainly for the academics and the faculties and schools, [they] have probably been a lot freer to do what they want to do, whereas [EA] ... is going to again, in their eyes, ... essentially constrain them.

Modes of situational logic in the cultural system:

It is fair to conclude that at the institutional level most of the university's business units (functional areas) were culturally guided by past history in tailoring IT products and services to suit their own interests. According to Archer (1995), this mode of situational logic, or so-called **specialization** (see Figure 4.8), creates a situation that aligns with people's specific needs (Archer, 2015). In this study, specialization is viewed as the act of a business unit making the IT environment suitable for their own purposes.

		The role of emergent properties: Second-order emergent			
		Contradictions		Complementarities	
		Necessary	Contingent	Necessary	Contingent
		correction	elimination	protection	opportunism
Morphogenetic/static cycle	T1	Situational logic			
		CEP's: Different modes of conditioning at Cultural system (CS)	syncretism	pluralism	systematization
	T2-T3	SEP's: Different modes of conditioning at Structural system (SS)	compromise	competition	integration
		CEP's: Different modes of interaction at Socio-cultural interaction (S-C)	unification	cleavage	reproduction
	T4	SEP's: Different modes of interaction at Social interaction (SI)	containment	polarisation	solidarity
		Structural and cultural elaboration or reproduction	Morphostatis	Morphogenesis	Morphostatis

Figure 4.8: Situational Logics at different strata (adapted from Archer, 1995 p. 303) (reproduced here for ease of reference)

Situational mechanism in the cultural system:

This study views situational mechanisms in the cultural system as an instrument of cultural environments (the generative power of cultural emergent properties, see Chapter 4) in shaping people's ideas, thoughts, beliefs and values that influence their work.

Specialization can be seen as the situational mechanism that conditioned the cultural environment at Time 1 of EA implementation (see Table 4.3). The situational logic of specialization represents a causal power of culture in the social world, and embodies the underlying mechanisms that influence people (agency) by constraining and enabling certain agential habits and routines. As a situational mechanism, specialization describes the cultural phenomena shaping people's reflexive deliberation in forming ideas about the IT environments suitable for their own purposes. To the members of a business unit, specialization is a natural way of getting something done within a particular cultural system, since to them, specialization is an instrument or established way of practicing their habits and routine. Seemingly, specialization was the legacy mechanism within the functional areas at UX prior to the EA program. It generated a specific socio-cultural interaction mechanism over the initial period of the Time 2 to Time 3 of EA implementation, since the situational mechanism is the fundamental reason for the socio-cultural shaping of individuals' desires and beliefs.

Time 1: Modes of conditioning in the structural system (SS):

Macro (structural) - Micro (people) context of structural system

Analytical history of the structural system:

The structural system at the initial stages of EA implementation (see Figure 6.3) will predispose agents' (people) to using IT environments to promote their important personal projects.

An analytical history shows that the past tendency of the university's IT environment from one to many (faculties, schools, and service centres), from simple to complex IT activities (activities based on competence and capability of the units), and from homogeneous to heterogeneous qualifications and skills, had changed the business units' arrangements for running IT environments from being relatively generalised to being functionalised or business-unit owned (governed by the needs of the individual business units).

According to UX official documents, this has led to more than 20 different database technologies in use across the wider business areas at the commencement of EA implementation, with numerous disparate tools and technologies to support backup, portal and collaboration services, media streaming, email, telephony, networking, monitoring etc., thus making the IT environment complex, inflexible and difficult to manage. Investment in technology tended to be siloed. The structural conditions at Time 1 were not only complex and costly to maintain, but also limited UX's agility in responding to trends in the higher education sector to address the broader business directions of the university. Most of the IT services were not easy to integrate and automate across system boundaries, resulting in inefficiencies. Differentiation of business unit activities had manifested as: a) fragmented data with no "single view"; b) some sharing of infrastructure but no shared resources; and c) inaccessibility from all devices due to different technology platforms between business units.

A corporate group member indicated the structural conditioning at UX actually impacted the way EA was implemented:

...I think a university is different to other organisations, because each school's driven by the industry that they're teaching future employees for, so they each have their different type of technologies they're using. It could be absolutely, totally different and the cost of maintaining and managing that centrally is really not viable I don't think, or sustainable, so really what we do is we look at something and say "will this have an impact on the enterprise, the University as a whole, or is this a need for the University across the board? [...] So we are taking a bit of a layered approach, but in saying that, there's probably not a lot that shouldn't be looked at from an enterprise perspective, because the majority of stuff will come onto our network and I've got to manage the network to support that.

Modes of situational logic in the structural system:

It is safe to conclude that at the institutional level a state of differentiation applied to IT arrangements (standard, application, investments, etc.) that provided exclusively for specific business unit activities. This situational logic of the structural systems during the initial stages of EA implementation, or **differentiation** (Archer, 1995) (see Figure 4.8), creates diversity through unity (Archer, 2013a). This study views differentiation as the act of creating divergent IT environments for the sake of convergence in IT self-organisation.

		The role of emergent properties: Second-order emergent				
		Contradictions		Complementarities		
		Necessary	Contingent	Necessary	Contingent	
Morphogenetic/static cycle	Time	Situational logic	correction	elimination	protection	opportunism
	T1	CEP's: Different modes of conditioning at Cultural system (CS)	syncretism	pluralism	systematization	specialization
		SEP's: Different modes of conditioning at Structural system (SS)	compromise	competition	integration	differentiation
	T2-T3	CEP's: Different modes of interaction at Socio-cultural interaction (S-C)	unification	cleavage	reproduction	sectionalism
		SEP's: Different modes of interaction at Social interaction (SI)	containment	polarisation	solidarity	diversification
	T4	Structural and cultural elaboration or reproduction	Morphostatis	Morphogenesis	Morphostatis	Morphogenesis

Figure 4.8: Situational Logics at different strata (adapted from Archer, 1995 p. 303) (reproduced here for ease of reference)

Situational mechanism in the structural system:

A situational mechanism at the structural level can be seen as the generative power of systems integration (SEPs) (see Chapter 4) in shaping people's situations in their social systems, institutional structures, roles and positions. **Differentiation** was the situational mechanism (see Table 4.3) that conditioned the structure at Time 1 and initial EA implementation, since it carries the underlying mechanism that structurally influences people (agency) synchronically by constraining and enabling agential powers. Differentiation can be viewed as an established process by which members of a business unit manage IT arrangements independently within a particular structural system. It was an instrument and a natural way of deriving IT arrangements at Time 1. As a causal power, differentiation describes the structural environment shaping agents' (people) reflexive deliberations in making IT arrangements for their exclusive purposes.

The situational mechanism of the structure at Time 1 generated a specific social interaction from Time 2 to Time 3 in view of the fact that this mechanism causally impacted people's actions and interactions with regard to the EA program.

Time 2 to Time 3: Modes of interaction at Socio-cultural (S-C):

Micro (people) - Micro (people) context of socio-cultural

Analytical history of socio-cultural:

Time 2 to Time 3 is the EA implementation interaction period (see Figure 6.3) when the interaction between social and cultural elements both shaped and were shaped by groups of individuals within the UX population. A population is part of a stratified model of people. In terms of MA (Archer, 1995), a stratified model of people (see Chapter 4) or so-called People Emergence Properties (PEPs) consists of: a) population (class, status, and power); b) organised groups (corporate agency); c) individual actors; and d) collectivities (primary agency).

The analytical history shows that during Time 1 to Time 2, the cultural system shaped people to use IT suitable for their own purposes. Specialization was the primary mechanism for managing the IT culture of UX business units. Culturally, this mechanism created a gap between expectation and reality, caused by poor governance and decision

making due to locally organised IT governance. During Time 2 to Time 3 corporate agents looked for a solution to address the lack of architectures initiatives and governance, and the PEPs were influenced by corporate agents' actions and concerns about the interests of particular collectivities (primary agents) and individual actors (the EA end-users i.e. lecturers, students, administration, researchers). For corporate agents, understanding the business units and end-users, whether they were students, academics or others, was paramount in providing a superior, targeted architecture and roadmap for guiding decisions.

Corporate group members indicated the main target of EA was involvement of UX stakeholders, gaining their support, and improving the quality of the targeted architecture:

Corporate agent A:

In the original program we tried to get involvement from right across, representation – not about the technology but about how they wanted to learn or teach or administer - whatever the role was.

...I don't think that there's any difference between those different stakeholder groups. It should all be... and I hope our enterprise architecture reflects that, we should all be focusing on achieving the same goal.

If we don't have governance to get to the endpoint, people will still be making decisions in silos and you'll never get to the endpoint, because part of the EA is to have that roadmap to... well, you've got that "this is what we want to look like and these are things we've got to do to get there. If we don't totally focus on those things and if we have other people making decisions that actually could undermine that, then we'll just be going round in circles.

Corporate agent B:

If you called the biggest stakeholders [the Enterprise Business Groups], so that's the heads of the service centres, the heads of the faculties, schools

and so on, I think because we've talked about [EA program] quite a lot in the various meetings that we've had, I think they do have an understanding of [EA program] somewhat. Whether they think it's positive or negative...

I think by the involvement of people outside of IT in enterprise architecture, it encourages the [EA] adoption over time.

Corporate agent C:

...it means that we can focus on the things that matter to the University, so [focus on] the stakeholder management relationship, management of the quality control, the prioritisation of activities... would be the best of both worlds [the EA program and the stakeholders].

Consistent with these arguments, the primary agent also recognised the importance of stakeholder involvement in the EA program:

I'd be involved in workshops where they're gathering information but I'm not involved in any implementation or development or framing of the strategy or implementation at all. I'm just mainly providing input."

...so people who run these systems [EA] are getting the buy-in and they're being listened to. It's a consultant-led program...

Some individual actors felt their involvement in the EA communication program would give considerable merit to their personal projects, while others felt the EA program would not directly impact the way they were doing things:

Individual actor A:

They keep [updating]... yes, and they are very good in terms of informing if one of the systems I'm using, like [X application, removed for reasons of anonymity] or whatever, [has] specific data-related.

Look, people try to be helpful, however their role is limited because of the compatibility, so I found them helpful and they generally make my life easier. Don't forget twelve or twenty years ago we had to type in a lot of things into

student databases and now everything is a click on the computer or the keyboard. So it does, because it makes our lives more straight forward. I don't have to liaise with so much paperwork because most of the things are done on computers. We generate invoices in the computer now, we don't have to ask in the written form, ask for invoices to be generated. I just simply go on Apps and I can generate an invoice to private or to somebody else inside UX – it goes, and it's also escalated to the relevant people.

...if the IT doesn't work I can't perform my job. It's simple. Because our job is now we're relying on technology...

Individual actor B:

...I was involved in those discussions [EA forum] as far as to see what we need in order to improve the IT services here, as I said, because we do not rely fully on the IT service but we use it to improve the results of our research.

...we are running smoothly and I believe that we have no problem with the IT. That means the system has been implemented properly.

Individual actor C:

Definitely – it [EA] will make it better. Of course it will make it better. Any new initiative, especially from the feedback of different stakeholders at UX, it will make it a better infrastructure and a better service that will benefit everybody.

Modes of situational logic at socio-cultural:

The actions of corporate agents to obtain appropriate political backing focuses on the rights, roles, and equitable treatment of shareholders in the EA program and is referred to as the situational logic of **sectionalism** (Archer, 1995) (see Figure 4.8). In the English dictionary, sectionalism is defined as “undue concern with local interests” (Oxford Dictionaries, 2015a). In the case of UX, the lack of appropriate stakeholder involvement in the EA program in the initial stages of EA implementation was the underlying cause of

sectionalism, and explains their observed lack of collaboration. Archer (1995) claims corporate groups necessarily promote sectionalism in the cultural domain – an example being when they seek to legitimise their advancement of EA implementation by espousing newly elaborated ideas.

			The role of emergent properties: Second-order emergent			
			Contradictions		Complementarities	
			Necessary	Contingent	Necessary	Contingent
			correction	elimination	protection	opportunism
Morphogenetic/static cycle	Time	Situational logic				
	T1	CEP's: Different modes of conditioning at Cultural system (CS)	syncretism	pluralism	systematization	specialization
		SEP's: Different modes of conditioning at Structural system (SS)	compromise	competition	integration	differentiation
	T2-T3	CEP's: Different modes of interaction at Socio-cultural interaction (S-C)	unification	cleavage	reproduction	sectionalism
		SEP's: Different modes of interaction at Social interaction (SI)	containment	polarisation	solidarity	diversification
T4	Structural and cultural elaboration or reproduction	Morphostatis	Morphogenesis	Morphostatis	Morphogenesis	

Figure 4.8: Situational Logics at different strata (adapted from Archer, 1995 p. 303) (reproduced here for ease of reference)

The Enterprise Business Groups (EBGs) (see Text Box 6.1) were formed by UX's EA management (UX executive) in response to the observed sectionalism within the various business centres – it was a necessary response to encourage EA support. These groups underpinned the technology governance framework and reported to the university's Architecture Board, which in turn assessed the impact of EA and made decisions about the governance approach. The EBGs were responsible for quantifying, reviewing and prioritising any proposed technology initiatives prior to submission to the IT Governance Committee. They provided a forum for learning about ongoing and planned technology programs across UX, and provided an opportunity for the university's leadership to discuss pertinent IT operational reports.

Interaction mechanism at socio-cultural:

At this time (Time 2 to Time 3) causal influences exerted by the cultural system (Time 1) were expected to impact the socio-cultural interaction. The interaction mechanism describes the causal relationships between the corporate groups and UX stakeholders. **Sectionalism** can be seen as the interaction mechanism (see Table 4.3) at a socio-cultural level in relation to IT-business transformation at UX.

The recognition of sectionalism served as a useful way to explain elements of the observed EA resistance. The response to sectionalism, i.e. creation of the EBGs, was important for the program's ultimate success. By involving the EBGs resistance from stakeholders can be identified early, and their input sought to shape the architecture thus garnering their support and improving the quality of the program. This mechanism encourages university-wide participation rather than focusing on local objectives. Recognising sectionalism and responding appropriately with the EA implementation have the capacity to limit resistance and create a culture of understanding across the university.

Long term responding to this mechanism in the cultural domain is critical for achieving measurable and sustainable outcomes from the IT-business transformation at UX as stakeholders culturally must move towards a commitment to global goals rather than local optimization. Stakeholders will be expected to contribute actively and seriously by quantifying their IT demands relevant to global requirements in submissions to the University Architecture Board (UAB). This takes the form of proposals which are discussed at the UAB and prioritised for consideration at the IT Governance Committee (ITGC) so that ITGC was able to make informed decisions with regard to IT requirements at UX.

Time 2 to Time 3: Modes of interaction at Social Interaction (SI):

Micro (people) - Micro (people) context of social interaction

Analytical history at social interaction:

The structural history prior to Time 1 revealed that, over the years, IT use within UX was not easily integrated and automated across systems boundaries, resulting in business inefficiencies. The different systems had different entry points, user interfaces and, in some cases, separate logins, leading to inconsistent and fragmented user experiences. Users were not able to access the full range of systems and services on their devices of choice in a consistent manner. Each system had its own data stores and data models, making a "single view" of key data entities difficult, particularly for students and their interactions with UX. Differentiation, principally of business unit activity, was the situational mechanism that preserved the structural status quo at Time 1 of EA

implementation. It was also apparent at Time 1 that the members of the business units were not ready to change direction and embrace the EA program.

Subsequently, at Time 2 to Time 3 (see Figure 6.3), the PEPs were influenced by the corporate agents' endorsement of the EA program to enable UX's decisions on technology investment for the best outcomes.

The EA program supported initiatives for different UX stakeholders (ranging from primary agents to individual actors) through various EA events (i.e. EA roadshows for the individual actors, and specific forums, such as cross-organisational business groups for the primary agents – the Enterprise Business Groups), where they could discuss and clarify IT requirements. IT demand versus IT supply became a transparent process, actively contributing towards UX's strategic goals. The outcomes were published on UX's website where they were visible to all stakeholders.

Some corporate agents suggested aligning the processes, committee meetings and controls with university-wide strategic planning and the annual planning cycle as a key factor for successful EA implementation.

Corporate agent A:

...there are some pieces of work that are happening in the enterprise architecture area over the next eight months that will produce some enterprise architecture artefacts, some strategies and roadmaps. Those strategies and roadmaps will be presented to the [Enterprise Business Groups] which are the groups that are providing the governance around the technology decisions within the University. So I guess in terms of the governance arrangements it will be that the [Enterprise Business Groups] and the business areas will have visibility of those enterprise architecture artefacts. The idea then would be that they would hopefully submit initiatives that would be aligned to those architecture strategies and roadmaps. They haven't been put in place yet because it's too early but they are planned to be implemented. Some of the things we'll do will be to publish them up on the UX website so they'll be visible to all staff, not just

the [Enterprise Business Groups]. I believe there will be some kind of roadshow that's going to take place in the University, so I guess there's going to be demonstrations or information sessions.

Corporate agent B:

...the concept of enterprise architecture at the University is extremely new. [...] It involved a number of stakeholder engagement activities [...]

The governance process is around providing visibility of the work that's being done, making sure that the right people with the right skills are making the right decisions at the right time.

Primary agents viewed endorsement initiatives for the EA program to different UX stakeholders as critical:

Primary Agent A:

Certainly I think it'll hit the ground for us once [my Department] roadmap up, so then we'll have a plan for the next five years. And I think that's a great part of the strategy – that they've looked at the organisation. And I don't think everyone's getting a roadmap, but I think they picked five or eight key areas and we're one, so we'll have our own roadmap of where to go in the future. And I think that process to get us to there is very well thought through.

Primary Agent B:

There has been a significant amount of engagement because we recognise that we need to be a part of the process, we need to have a strong voice in order for the projects from [my Department] perspective to get put onto that large agenda. ...– yes, we have to be engaged

However, the EA events in the university's functional areas in particular, were not as effective as expected. It appears some (primary agents) misconstrued the purpose of the cross-organisational business forums (the Enterprise Business Groups) and viewed them

as a potential source of funding for what they wanted to do. Some thought EA was a waste of time and not profitable for their business areas, and subsequently became passive participants. To overcome the ineffectiveness of the EA forums due to the misconception and lack of engagement, the corporate agents employed a different model of engagement to get people's buy-in and acceptance. This model engaged with people in each of the university's functional areas through diversification. In the English dictionary, diversification is defined as the act or process of reducing risk or volatility by investing in a variety of assets (Oxford Dictionaries, 2015b). One influential corporate agent articulated the lack of engagement in EA forums as follows:

We had the [Enterprise Business Groups] that fed into the [University Architecture Board and] IT Governance Committee, and what we found was that people I guess misconstrued the purpose of the [Enterprise Business Groups] and really thought it was about getting some funding to do what they wanted to do. And when they didn't get the funding to do what they wanted to do there was a lot of "we think they're [EA program] not working", "they're [EA program] a waste of time" and all that sort of thing, and a lack of engagement by the members of those groups. So instead of coming along and talking about "this is what we're trying to achieve in our business area or our school" or whatever it might be, they'd just basically be passive participants. So we recognised that that wasn't going to work, and we found that where things really work in the University is when you have conversations with people. We need to get people's buy-in and acceptance of this and to get that's not through formal structures. The University's very good at putting in formal structures, the committees and things like that, but how effective they are I'm not quite sure. They certainly weren't very effective from an enterprise architecture perspective, so now we've actually turned that totally around and we talk now about our engagement model. So we've now got a new model whereby we engage with individuals. Of course this has been made much easier now since we've only got [xxx, number of] schools to do it with, with each of those [xxx, number of] schools and with each of the service centres. So each of them had basically two

account managers, for want of another word. One that understands the strategic stuff, the enterprise architecture and all of that sort of thing, and the other one that has more an operational focus, like what are the problems you're experiencing right now? So we will meet on a regular basis with each of those schools and service centres around the University and that's [one of] the model we're going forward with now.

Consistent with this argument, a primary agent also highlighted similar issues with EA forum engagement:

Whether or not they actually understand the [EA] content – I don't think they [the corporate groups – corporate agents] do– because simply from the point of view... you know, they [the corporate groups – corporate agents] say it simply takes forever and a day. They [the corporate groups – corporate agents] actually don't understand the rationale. They [the corporate groups – corporate agents] are trying with stakeholder [the primary agents] engagement but I think they [the corporate groups – corporate agents] need to know a lot more about it, what components are sitting where. [...] we've got all these massively beautiful [enterprise architecture] diagrams in there to be prepared by consultants at an outrageous cost, and that's alienated people. But I think that the cost [to develop the enterprise architecture] and the way that it's been done [enterprise architecture implementation] is really, really...[unreasonable] particularly when all the other centres and faculties are having to have some financial constraints just to deliver effective teaching and learning and research and support those activities. And I think that's really impeded stakeholder [primary agents] engagement and coloured their understanding for it. And I think the thing is that they [the corporate groups – corporate agents] are in one way better off, they're [the corporate groups – corporate agents] accepting of the concepts in there which has been better, but worse in the sense that for all this we're [primary agents] not seeing anything. It's a hidden thing, the enterprise architecture.

Modes of situational logic at social interaction:

In terms of MA (Archer, 1995), the actions of corporate agents in engaging with varied stakeholder interests is the situational logic of **diversification** (see Figure 4.8). This study viewed diversification as a process of identifying those who would gain and those who would lose from EA implementation, and developing a strategy for dealing with them. Diversification describes the social situation at social interaction level: a) between the corporate agents and the collectivities; and b) between the corporate agents and individuals.

		The role of emergent properties: Second-order emergent				
		Contradictions		Complementarities		
		Necessary	Contingent	Necessary	Contingent	
		correction	elimination	protection	opportunism	
Morphogenetic/static cycle	Time	Situational logic				
	T1	CEP's: Different modes of conditioning at Cultural system (CS)	syncretism	pluralism	systematization	specialization
		SEP's: Different modes of conditioning at Structural system (SS)	compromise	competition	integration	differentiation
	T2-T3	CEP's: Different modes of interaction at Socio-cultural interaction (S-C)	unification	cleavage	reproduction	sectionalism
		SEP's: Different modes of interaction at Social interaction (SI)	containment	polarisation	solidarity	diversification
T4	Structural and cultural elaboration or reproduction	Morphostatis	Morphogenesis	Morphostatis	Morphogenesis	

Figure 4.8: Situational Logics at different strata (adapted from Archer, 1995 p. 303) (reproduced here for ease of reference)

As members of the Enterprise Business Groups (EBGs) and key stakeholders in the future success of the university, primary agents were given the opportunity to discuss and decide, within their EBG, what value their initiatives would bring to UX. Chairpersons of the EBGs were also voting members of the IT Governance Committee, where the full university-wide portfolio of work was discussed. With improved governance, transparency in the capturing, prioritising, funding and managing of initiatives was significantly enhanced.

A number of trusted IT personnel from each business area attended all the EBGs – two of them were also regular attendees at IT Governance Committee meetings. The role of these stakeholders was to ensure the corporate agents communicated relevant information at the EBGs. In addition, these new forums improved the level of transparency in quantifying and prioritising IT demand and supply at UX, and served as a

forum for sharing information between EBGs via reports. Put simply, each EBG was privy to the broader EA portfolio of work at UX. This level of transparency offered opportunities for leveraging synergies and for sharing information with all participants on how their areas might be impacted.

Interaction mechanism at social interaction:

This study viewed social interaction as a social process whereby people act and react with each other at different social levels in society. **Diversification** was the interaction mechanism (see Table 4.3) at a social interaction level at the time of architecture implementation at UX. Recognising and responding to diversification prompt corporate agents to engage with primary agents and individual actors to ensure alignment of the EA program with the university's goals, whether these are to be adopted locally by business units or globally by the university.

Responding to this mechanism can lead to identifying: a) who gains and who loses from EA implementation; b) who will make the decisions; c) who controls resources; and d) who has influence. As a mechanism diversification provides a solution for the diversity of university business activities and its collegial management (see Chapter 2). The varied perceptions of the technology environment and information systems on the part of stakeholders will necessarily result in differences in understanding the EA program. The value of recognising diversification therefore lies in identifying key stakeholders and their power, influence and interests, and defining the key business requirements to be addressed in the EA implementation. Responding to diversification in a positive manner is vital for successful EA.

From a technical point of view, diversification explores the fitness of core applications for purpose – to reuse where possible, avoiding customisation and reducing the system's complexity. From a business point of view, diversification focuses on business outcomes, i.e. sustainability, flexibility and agility, given that the university's business requires its members to operate in more than one information domain.

Time 4: Structural and cultural elaboration of agents (Structure, Culture, and Agency):

Micro (people) - Macro (structure and culture) context of elaboration

Analytical history at structural and cultural elaboration of agents:

In Time 2 to Time 3, people's (micro context) actions and interactions generated various intended and unintended social outcomes at Time 4, which influenced structural and cultural change (macro context) as follows: a) people's actions and social interactions (SI) elaborated upon the composition of social structure (SS) by modifying internal and necessary structural relationships and introducing new modes of situational logic; and b) the cultural system (CS) was elaborated due to people's actions and interactions at a socio-cultural level (S-C), which modified current logical relationships and introduced new modes of situational logic (Archer, 1995).

The MA helps to explain that the university environment (the state of its structure and culture) was modified by the corporate agents during Time 2 to Time 3 in the interest of EA implementation. From a structural point of view (social interaction or SI), the governance process had been modified to a new integrated structure (a rationally balanced structure: diversification mechanism) that emphasised accountability and identified all the processes and controls required to align technology solutions with UX business strategies. This new state of rational inquiry and sound evaluation of all IT activity decisions supported university performance, financial objectives and risk management. From a cultural point of view (socio-cultural or S-C) the existing socio-cultural practices (habitual actions, established routines, traditional preserves, and conventional divisions of activities) had been modified into new socio-cultural practices (addressing the sectionalism mechanism) to enable the right people with the right skills and experience to make technology decisions through the formation of committees and delegations. This ensured that technology, as a strategic resource, delivers value to the university over the long term.

A number of EA events which occurred during the period Time 2 to Time 3 resulted in Time 4 being approached in a tactical opportunistic way; that is the tendency of taking advantage of social events (and non-events). For instance, the IT projects of primary agents and individual actors outside the control of corporate agents are influenced to

achieve EA opportunity (IT-business opportunity). The opportunism tendency generated from SI and S-C is an expedient action, guided primarily by the EA events of architecture principles. These opportunistic actions embodied the following principles for EA implementation at UX: a) transparency: a clear EA governance structure and process. How decisions were made in EA forums, who had input and who made decisions were visible and transparent to the UX community; b) accountability: IT Governance Committees and task forces (University Architecture Board and Enterprise Business Groups) were held accountable for delivering on their responsibilities; c) responsibility: EA governance structures and processes engaged people with the right skills and experience to support the process at all levels; and d) appropriate representation: faculties, schools and centres across UX were represented at appropriate levels.

Situational logic of aggregation:

The policies and practice of corporate agents in ensuring EA compliance with stakeholders' requirements to provide the best outcomes for the university is referred to as opportunism (see Figure 4.8]. **Opportunism** is the situational logic of aggregation generated in the past period (T2 – T3) between social interaction and the socio-cultural level (Archer, 1995).

		The role of emergent properties: Second-order emergent				
		Contradictions		Complementarities		
		Necessary	Contingent	Necessary	Contingent	
Morphogenetic/static cycle	Time	Situational logic	correction	elimination	protection	opportunism
	T1	CEP's: Different modes of conditioning at Cultural system (CS)	syncretism	pluralism	systematization	specialization
		SEP's: Different modes of conditioning at Structural system (SS)	compromise	competition	integration	differentiation
	T2-T3	CEP's: Different modes of interaction at Socio-cultural interaction (S-C)	unification	cleavage	reproduction	sectionalism
		SEP's: Different modes of interaction at Social interaction (SI)	containment	polarisation	solidarity	diversification
	T4	Structural and cultural elaboration or reproduction	Morphostatis	Morphogenesis	Morphostatis	Morphogenesis

Figure 4.8: Situational Logics at different strata (adapted from Archer, 1995 p. 303) (reproduced here for ease of reference)

At Time 4, corporate agents appeared to understand what was real and possible, and seemed able to deal with problems in an effective and practical way through

opportunistic action. One corporate agent indicated how to deal with problems and opportunity:

And the other thing that we do too, is we identify champions. We've just finished a business case for collaboration [EA] capability, we've had it endorsed, we've actually had it approved for funding, and we're finding champions around the University, [Mr X] is one of those. So I went to a meeting last week and it was with the associate deans of Teaching and Learning, and there was one particular associate dean who just wanted to use it as a "I'm gonna have a big whinge about IT" and "what's wrong with IT?" and "how do we know that this solution that ITs come up with is right?" and all this sort of thing. And [Mr X] basically took the mantle, I didn't have to do anything, [Mr X] took the mantle and said "we've all had a look at it. It might not be perfect but it's a lot better than what we've got now". But what it means is he sees the biggest part of this won't be technology that we're going to use, it'll be the cultural change, and the way we have to change the way we do things. And he said "that's our problem, not IT's problem". So getting those sorts of champions; getting the support of the Deans and then getting the champions.

Opportunism increases cultural fairness and is free from socio-cultural manipulation, as the opportunistic tends to take up a compatible practice (Archer, 1996). Existing socio-cultural practices, such as habitual preoccupations and established routines, may well diminish and be replaced by an increased willingness to explore new architecture and congruent possibilities. Stakeholders, particularly the primary agents and individual actors, have substantial freedom to adopt the EA program which has come into view. Through the accommodation of opportunism, EA can be designed to induce adoption in accordance with stakeholders' interests.

Primary agents in particular understand that EA programs needs to make more efficient use of technology platforms and its services to drive down costs and improve the reliability of core business services. A number of opportunities exist to leverage technology platforms more widely and create reusable enterprise technology services

wherever possible. The situational logic of opportunism requires a basis for building collaborative opportunities across faculties, schools and centres. EA is in line with the evident opportunities that IT can provide. It could be argued that without EA benefits of opportunism cannot be properly developed.

The university moves from competition/elimination towards opportunism as systemic integration increases with the new Vice Chancellor in charge – opportunism is still the basic situational logic as the university faces a common threat of new entrants and the global trends in HE (i.e. Massive Open Online Courses: MOOCs) – the challenges facing university require novel ideas and new alliances and UX has shown itself to be good at that “when material opportunities arise that resonate with the social and cultural properties, stimulating opportunism (Archer 1988).” Universities must be innovative in their offerings in order to gain enrolments. As explained by Archer (1998, 243) “habitual preoccupations, established routines, traditional preserves or conventional divisions of subjects – may well reduce subjective willingness to explore new and congruent possibilities, but these will usually coexist with various sticks and carrots which stimulate originality, innovation and experimentation (as in the derived sequence). The actors concerned have substantial freedom to survey or to ignore the broader horizon which has come in to view...”. The sticks and carrots are enrolments - staff are rewarded if they are good. The habitual and routine elements of course approvals requiring a 2-year time line constrains this freedom - universities have to be careful to not have systemic controls dominate freedom to act (the province of protection as a situational logic).

Transformation mechanism:

Opportunism as the situational logic at the time of transformation (Time 4) motivates different forms of strategic action by predisposing different sections of the UX population to supporting their own interests: the process of tailoring stakeholders and their power, influence, and interests provides the opportunity to remove obstacles that are operating elsewhere in the university. The EA support of opportunism allows EA to be accepted and to provide transformation. It can be safely concluded that opportunism represents the generative mechanism of morphogenesis and is the transformation mechanism at Time 4 (see Table 4.3). As it has a net systemic situation of great cultural variety, that

generates: a) a mutually beneficial synergism of opportunities at structural level; b) a socio-cultural reintegration as harmony at cultural level; and c) a gradual shift of people from relationship of EA rivalry towards to ones of EA supporter and then to synergy which produced the EA co-operative relationship. (Archer, 1995; 1996; 2015).

The accommodation of opportunity with EA can be seen as a mechanism to engage the involvement and support of all stakeholders with an interest in or responsibility for EA implementation and the objective of ensuring that the university's interests are served and EA objectives achieved. The recognition of EA supporting opportunism served as a useful way to identifies stakeholders' needs with a clear sense of EA being in their interests in and then having responsibility for EA implementation. Through this mechanism UX strategic business directions and its architecture are aimed at: a) a culture that encourages EA participation in university-wide rather than local objectives; b) an integrated structure that manages EA activities across interest areas; c) socio-cultural practices that foster meaningful, as opposed to symbolic, participation in EA management processes; and d) commitment, through social interaction, to ongoing EA implementation and challenges, and openness to other parties' advice.

As a mechanism, opportunism also underpins EA initiatives by justifying the risks associated with the architectural vision, and assesses the readiness of IT-business transformation and the potential risks associated with it. It shows a clear line of sight between technology decisions and business outcomes which provide UX with: a) a unified, targeted IT architecture to engage business stakeholders and deliver stronger business outcomes; b) a tangible link between the core strategies of the university and enabling IT plans; and c) an objective method for assessing planned technology investment.

The opportunism evident within UX needs to avoid: a) the act of a business unit making the IT environment suitable solely for their own purposes (specialization: C.S. level) and; b) the act of a business unit creating divergent IT environments for the sake of convergence in IT self-organisation (differentiation: S.S. level).

Opportunism is supported via a communication strategy intended to achieve a successful implementation of EA program (see Text Box 6.1). Such a strategy, namely through: a) addressing sectionalism (S-C. level: to provide a forum for learning about ongoing and planned technology programs across UX and, provided an opportunity for the university's leadership to discuss pertinent IT operational reports) and; b) addressing diversification (S-I. level: to ensure the corporate agents communicated relevant information at the forum – a level of transparency offered opportunities for leveraging synergies and for sharing information with all participants on how their areas might be impacted). As explained by Archer (1995, pp. 303-304):

For both culture and structure, the systemic level (presented on the top line for each) [see Figure 4.8 below] shows the full range of developments which can be generated if the respective situational logics are all successfully followed (and each of the relevant contingencies materializes). As we have seen, those Corporate Agents whose interests are vested in any one of these four states of affairs, in either the cultural or social system, have a corresponding ideal at the level of social or socio-cultural interaction which is most conducive to securing the systemic status quo desired by them. To this end various forms of structural and cultural power will be deployed by them as containment strategies⁴ intended to preclude deviant social developments; such preferred social states are presented on the bottom line for both culture and structure. However, as always, these are conditional effects (of the C.S. on the S-C and of the SS on SI) and their success is no foregone conclusion. Everything in fact depends upon their social reception. And that is determined by the relational negotiating strength between the Corporate Agent promoting the systemic state in question and the array of PEPs which have now disengaged in society, whose goals may be at variance with those of the former.

			The role of emergent properties: Second-order emergent			
			Contradictions		Complementarities	
			Necessary	Contingent	Necessary	Contingent
			correction	elimination	protection	opportunism
Morphogenetic/static cycle	Time	Situational logic				
	T1	CEP's: Different modes of conditioning at Cultural system (CS)	syncretism	pluralism	systematization	specialization
		SEP's: Different modes of conditioning at Structural system (SS)	compromise	competition	integration	differentiation
	T2-T3	CEP's: Different modes of interaction at Socio-cultural interaction (S-C)	unification	cleavage	reproduction	sectionalism
		SEP's: Different modes of interaction at Social interaction (SI)	containment	polarisation	solidarity	diversification
	T4	Structural and cultural elaboration or reproduction	Morphostatis	Morphogenesis	Morphostatis	Morphogenesis

Figure 4.8: Situational Logics at different strata (adapted from Archer, 1995 p. 303) (reproduced here for ease of reference)

From these findings, it can be seen that: a) the opportunism evident within the university needs to avoid the specialization and differentiation via an effective **communication** strategy concerning meeting stakeholders needs, ranging from the initial EA initiative to ongoing governance. Effective communication of targeted architecture to the right stakeholders at the right time is critical for EA implementation; b) opportunism presents a loose situational logic requiring socio-cultural practices to take advantage of it. Rather than addressing challenges of cultural complexity, corporate agents led the university community's focus on issues such as sourcing and sharing business capability, expanding business capability with the new architecture, and the university's future vision. Developing a **collaboration** plan to address the social complex situation presented an opportunity to achieve a more flexible architecture solution.

The relationship between first- and second order emergent – the morphogenesis:

Based on Archer's (2015) MA paradigm it can be argued that the emergent phenomena of EA programs originate from the time between contextual conditioning of EA implementation (downward causation) and people's responses to the implementation (upward causation), which are empirically distinct and temporally sequential. The structural and cultural elaboration begins in the period of Time 2 to Time 3, and emerges at Time 4, in a form based on the relations between the agents (people) in the interactive network during Time 2 to Time 3. Mechanisms at Time 2 to Time 3 arise from a process of morphogenesis in the second-order emergent properties, while mechanisms in Time

1 arise from previous morphogenetic cycles in the first-order emergent system (the results of past socio-cultural and social interaction prior the EA implementation). Such conditions determine the potential bargaining power of people in adopting the EA during Time 2 to Time 3.

The second-order emergent system shows the structure and culture also experienced elaboration and transformation into new structural and cultural practices. Figure 6.4 describes the relationship between first- and second-order emergent properties, the identified generative mechanisms, and the MA outcomes.

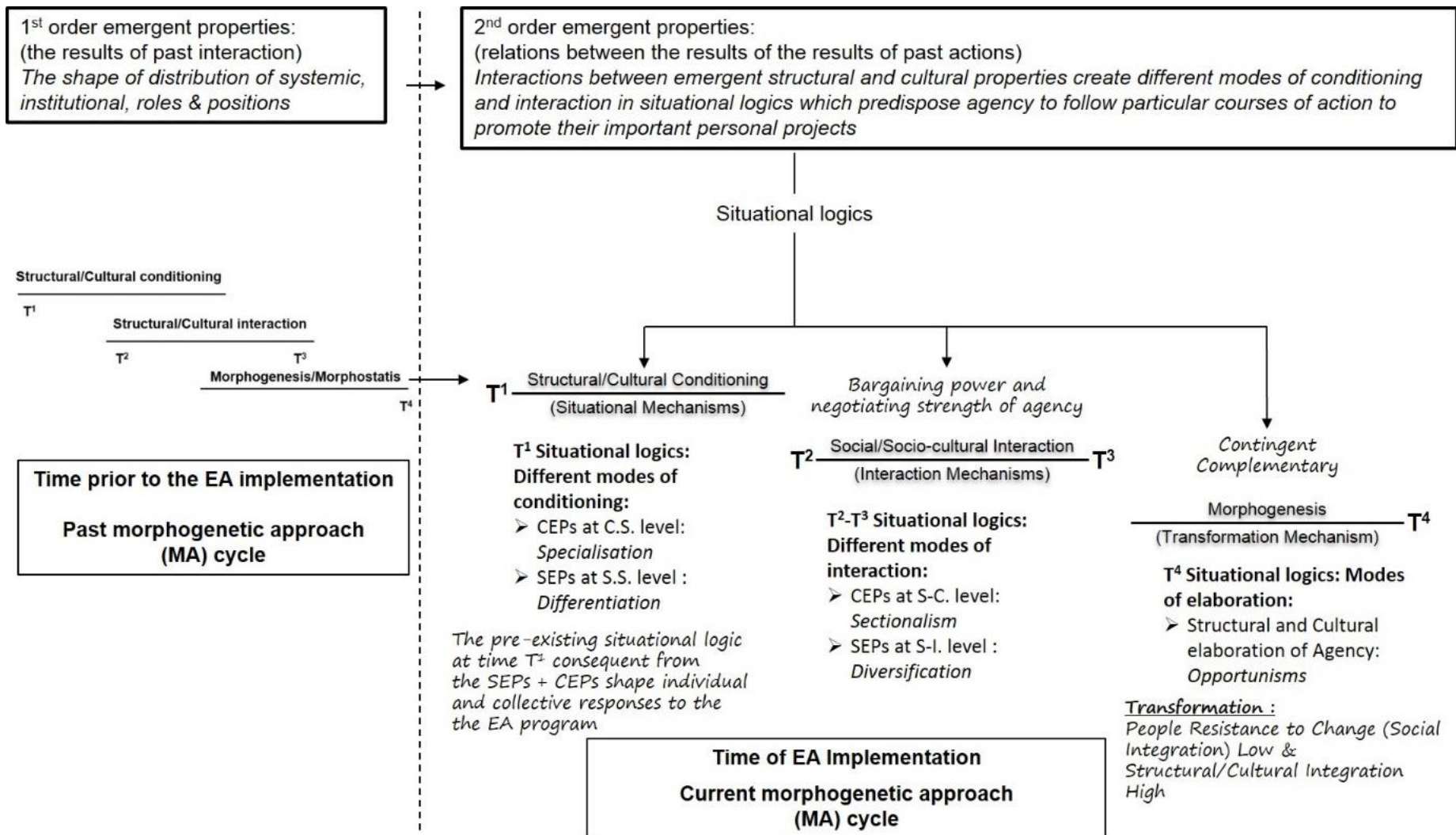


Figure 6.4: The analytical histories of emergence: Relationship between first- and second order emergent properties, generative mechanisms, situational logics, and MA outcomes (adapted from Archer, 1995)

Key implementation mechanisms:

Based on the research findings it is evident that several different mechanisms were operating simultaneously (i.e. several different mechanisms at Time 2 to Time 3), and that the relation between the generative mechanisms (i.e. mechanisms at Time 2 to Time 3 generated transformation mechanisms at Time 4) is contingent. These contingent effects are what generated the key mechanisms or **key implementation mechanisms**. Therefore it can be safely concluded that: a) effective **communication** and **collaboration** are key implementation mechanisms for effective accommodation of the prevailing transformation mechanism (opportunism) at Time 4; and b) opportunism as the prevailing SL and transformation mechanism was fundamental in supporting the premise of EA. As indicated by the corporate agents, a key focus of EA was communicating the benefits to stakeholders. In addition, they viewed communication and collaboration as the primary factor in widespread EA adoption:

Corporate agent A:

My understanding of the communication program is probably these [EA] roadshows that apparently are going to happen at some point. I think there is a real risk though, of it being presented at too high a level within the University and people just, again, not understanding it and then the perception is 'oh, that's something that IT does', and not understanding that they need to be involved in it, and if they're not involved in it there's going to be a disconnect between what potentially IT people or consultants think is the enterprise architecture and what the business actually needs. You're not going to have that joined. So it's incredibly important that there's a communication program in place and that the stakeholders here accept enterprise architecture and that they understand the importance of it";

...you're looking at strategies to get to an endpoint, so you're saying where is the business now? Where does the business want to be? And what do we need to do to get there? But what do we need to get there are potentially all projects or pieces of work, programs of work that have to be undertaken

to get there. And the technical side of things, well they're delivering those projects or they're feeding into those projects, so if we don't have a collaboration with them then it just ends up with this siloed environment which is what we're trying to come from.

Corporate agent B:

I think the main change from EA will be about governance and investment in technology - who makes the decisions? ... [The purpose of the EA program] is really educating people about the value of EA and getting them to understand it and then communicating and keeping the linkages between the EA and the business of the University. [...] ...enterprise architecture can become a very theoretical thing that's done, and if you don't get the communication right and if you don't present it in the right way to an organisation it becomes a heap of artefacts that gets stored away here in a repository and nobody ever looks at again. So it's about continually giving the messages and communicating that and creating those linkages”;

We've just finished a business case for collaboration capability, we've had it endorsed, [and] we've actually had it approved for funding... [For instance], the Deans of Schools sit at the University executive... we still have the IT Governance Committee but anything that comes out of the IT Governance Committee gets endorsed. When it gets endorsed by the IT Governance Committee it then goes in to University Executive for approval, and that has a lot more power because now the Deans of Schools are actually part of making decisions about what technology we invest in, which is what it was always meant to be, but they weren't taking that opportunity to do that. They weren't feeding in from the bottom up, so now that they're sitting up here they can take that accountability from up here. They are the ones that then need to deal with pushing it down through their schools.

In review, identification of the key implementation mechanisms and social responses triggered by EA implementation were a central goal of applying the morphogenetic approach

in this study. The findings revealed that each of the key implementation mechanisms defined theoretical explanation (abstraction) of the generative mechanisms (from Time 1 to Time 4) representing the structures and cultures of University X during EA implementation, each aimed at a particular context of stakeholders (people) and addressing a particular set of concerns. In this study this is called **social responses**.

The social responses triggered by EA implementation were dependent on the interplay between social integration (PEPs) and the structural and cultural (SEPs and CEPs) integration (see Chapter 5). In terms of this study people's resistance to change (social integration) was low and structural and cultural integration was high, which led the organisation to social transformation by supporting the mechanisms identified in encouraging individuals' acceptance of EA practices. The social responses triggered by EA implementation at UX is known as **contingent complementarity** (Archer, 1995) (see Figure 4.7), which required cultural variety within the EA program and meant that the architecture needed to be structured to accommodate the business units' cultural differences.

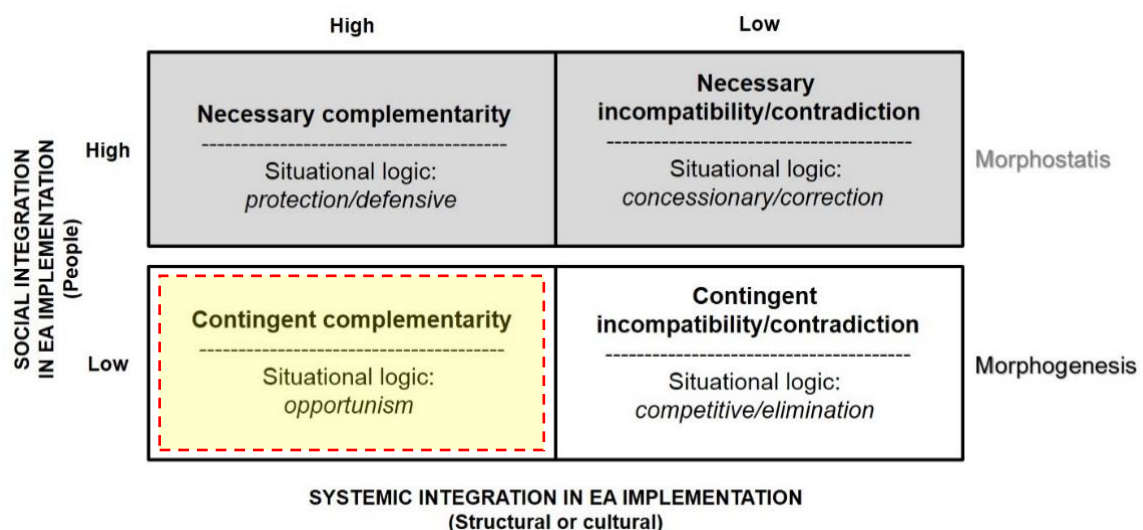


Figure 4.7: Morphostatis vs morphogenesis: Situational logics in social and system integration in EA implementation (adapted from Archer, 1995, pp. 218 and 295) (reproduced here for ease of reference)

6.3.2 Abduction stage

The stage referred to as abduction or theoretical redescription or recontextualisation is where original ideas (a conceptual framework or theory) about the object of study are placed in a new context (Danermark et al., 2002). In other words, abduction seeks connections or relations, not directly observable, between the EA events (in the empirical domain) and the EA context identified (mechanisms and situational logics in the real domain – MA). This stage gives new meaning to already known EA events.

Since the mechanisms at Time 1 arose as a result of past interactions (a time prior to EA implementation – the first-order emergent), only the mechanisms arising from Time 2 to Time 3 and Time 4 (the second-order emergent) were used in the abduction analysis to formulate new ideas about the interconnection of EA events and contexts.

Data analysis and findings:

1. Relation between particular EA event and EA context

Table 6.1 below shows the relation between particular EA events and EA contexts (mechanisms and situational logics within cultures and structures) by redescribing or recontextualising EA events from a set of ideas (in the form of a conceptual framework or a theory).

Table 6.1 Relation between particular EA event and EA context

EA event	EA context
Events of the architecture compliance:	T ² – T ³ , S-C (sectionalism mechanism): Changes in habitual action by means of encouraging participation towards university-wide rather than local objectives. Creating social circumstance of <i>synergy management</i> .
	T ² – T ³ , SI (diversification mechanism): Changes in social formation by means of ensuring alignment of the EA program that UX wishes to be performed, whether these are to be performed locally to the units or globally to the University. Creating social circumstance of <i>linkage management</i> .

EA event	EA context
	<p>T⁴, Transformation (opportunism mechanism): Opportunity by means of supporting more detailed definition of a consolidated, cross-business unit roadmap within the EA program. Creating social cohesion of <i>strategic alliance</i>.</p>
Events of the architecture principles	<p>T² – T³, S-C (sectionalism mechanism): Changes in established routines by means of focusing on the requirements of users and stakeholders. Creating social circumstance of <i>diversification management</i>.</p>
	<p>T² – T³, SI (diversification mechanism): Changes in social composition by means of engaging in varied stakeholders' interest of EA program. Creating social cohesion of <i>distributed leadership</i>.</p>
	<p>T⁴, Transformation (opportunism mechanism): Opportunity by means of removing obstacles that are already carried out elsewhere in the University, add EA program specific tasks to align the key business requirements. Creating social circumstance of <i>linkage management</i>.</p>
Events of the cross-organisational architecture board	<p>T² – T³, S-C (sectionalism mechanism): Changes in conventional divisions of activities by means of placing the stakeholders' input/feedback to shape the architecture and ensure their support to improve the quality of the EA program. Creating social circumstance of <i>synergy management</i>.</p>
	<p>T² – T³, SI (diversification mechanism): Changes in social formation by means of introducing a good EA governance through transparency in the way EA initiatives are captured, prioritised, funded and managed to completion. Creating social cohesion of <i>strategic alliance</i>.</p>
	<p>T⁴, Transformation (opportunism mechanism): Opportunity by means of focusing on EA issues such as sharing of business capability, sourcing of business capability,</p>

EA event	EA context
	and exposure of business capabilities to new architecture and university future theme. Creating social cohesion of <i>distributed leadership</i> .
Events of the EA roadshows and workshops for the University society	T ² – T ³ , S-C (sectionalism mechanism): Changes in established routines by means of building culture of understanding across UX and provide useful insights for the EA Implementation. Creating social cohesion of <i>strategic alliance</i> .
	T ² – T ³ , SI (diversification mechanism): Changes in social composition by means of diversifying to identify those that will gain and those that will lose from EA program, and then develop a strategy for dealing with them. Creating social circumstance of <i>diversification management</i> .
	T ⁴ , Transformation (opportunism mechanism): Opportunity by means underpinning any EA initiatives in identifying the risks associated with the architecture vision and assess the readiness level of IT-Business transformation and the potential risk associated with it. Creating social circumstance of <i>linkage management</i> .

2. Placing a new context of EA within key ‘implementation’ mechanism

In this analysis of theoretical redescription or recontextualisation, a new concept of ideas (EA context) has two meanings depending upon the social situations:

- a) Social situations that are influenced by activities associated with EA implementation. This can be regarded as a **social circumstance** or **event** that happens whether we experience them or not. It can be seen that social circumstances or events not directly observable within EA implementation have been generated by different mechanisms.
- b) Social situations that are influenced by the willingness of UX members to cooperate with one another in order to realise the EA implementation. They can be regarded as a **social cohesion** or **non-events** that happen whether we experience them or not.

Non-events not directly observable within the EA implementation have also been generated by different mechanisms.

Building on Danermark et al.'s (2002) methodological model, it can be argued that theoretical redescription or recontextualisation provides deeper knowledge of particular EA events. In this study, the social situations (social circumstance and cohesion) that influenced the university community as events and non-events located in the actual domain (see Figure 5.11) were identified to detect relations between the new contexts of EA (Table 6.1) and the key implementation mechanisms (identified at analytical resolution stage – MA analysis) as follows:

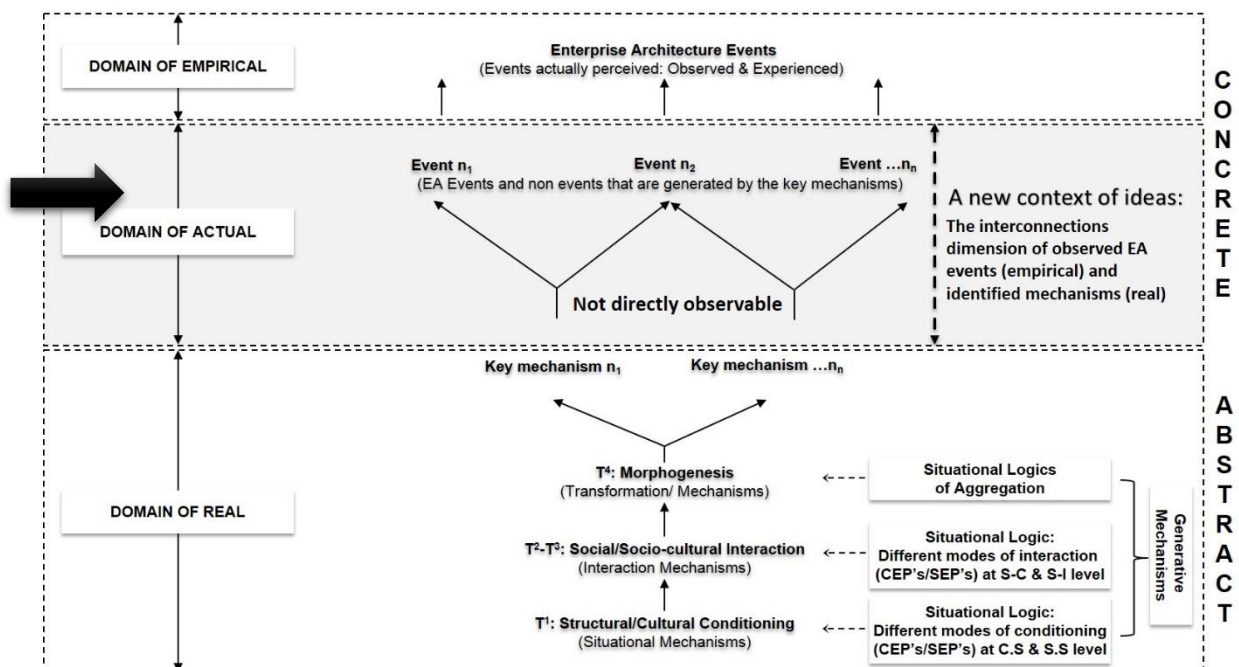


Figure 5.11: 'Abduction' process (reproduced here for ease of reference)

- a) **Distributed leadership (non-event):** Successful EA implementation at UX depended on leadership that was both designated (i.e., someone was formally in charge of the program) and distributed (i.e., professionals, partner organisations and teams shared responsibility for mobilising efforts and delivering the program components) (Best et al., 2102). Distributed leadership engages individuals at all levels in leading the IT-Business transformation (change) to keep everyone (primary agents and individual actors) on board and focused on the program. EA endorsement was sponsored by corporate agents (executives) who were appropriately aligned to provide leadership and able to articulate and defend the needs of the endorsement at the executive

level. These executive sponsors were engaged through **communication mechanisms**.

- b) **Synergy management (event)**: Where business objectives of the units (the university's functional areas) deviate from the EA program, significant effort is required to avoid wide-ranging impact. This activity, flagged as the right set of circumstances, was addressed by the **collaboration mechanism**.
- c) **Linkage management (event)**: The process of tailoring stakeholders and their power, influence, and interests provided an opportunity to remove obstacles elsewhere in the university, thereby adding to EA program-specific tasks of aligning the key business requirements, and was addressed by the **collaboration mechanism**.
- d) **Strategic alliance (non-event)**: Social situations supported a more detailed definition of the consolidated roadmap (the university's functional areas) within the EA program, was addressed by the **collaboration mechanism**. Through the **communication mechanism**, widespread communication and understanding of EA by all UX stakeholders was enabled, and reassured them the EA program would address their concerns.
- e) **Diversification management (event)**: In making decisions about diversification of the business-unit roadmap, technology environment, and socio-cultural practices, **communication** acted as the mechanism to derive a series of transitional changes for delivering continuous business value to realise the EA implementation.

6.3.3 Retroduction stage

Based on the ideas of Danermark et al. (2002), retroduction describes a mode of inference by which this study arrived at what is basically characteristic and constitutive of people adopting the EA (see Chapters 4 and 5), since MA still posed the central problem of how social structure, culture and agency are actually linked (their social relationship: Archer, 2008). In other words, this stage clarified the basic conditions for a social relationship: people's actions and interactions; people-focused mechanisms; reasoning and knowledge within EA implementation. To clarify these basic conditions which are not directly observable within the EA implementation, the retroduction stage went beyond the empirical (something that can

be observed and experienced). It is also called transfactual argumentation (Danermark et al., 2002).

This stage used reflexivity theory (Archer, 2008; 2010a) (see Chapters 4 and 5) to clarify the basic conditions outlined above and attain knowledge about people's internal relations that would make EA implementation at UX succeed. Exactly how people's internal relations are viewed was made possible by reflexivity theory of internal conversations and use of the reflexivity tool, the ICONI (see Chapter 5), to identify how people subjectively defined particular courses of action (personal concerns) in relation to their objective social circumstances (context of EA). These internal conversations explained how people responded to the embedded mechanisms (interaction mechanisms) of EA implementation. The question can also be answered by reconstructing people's reflexive deliberations (their internal conversations) in regard to adoption of EA, as these reflexive deliberations form an important mechanism for explaining how structures and cultures constrain and enable agents to adopt the program (reflexive mediation of mechanisms).

As mediatory mechanisms (see Chapter 4), reflexivity theory described people's adoption of EA (their actions and interactions), shaped by the interplay between the context (mode of people reflexivity in social relationships at the time of EA implementation – see Chapter 5) and concern (people's personal reflexivity concerns at the time of EA implementation – see Chapter 5). Since individual responses are diverse because of their different modes and degrees of concern, their collective reflexivity (social relationships) was also described. Collective reflexivity is not about people thinking in the same way, or people sharing external commitments, or people having a mutual intention; but rather about people being in a special relationship which makes them reflexive in a social instead of a personal way (Donati, 2008, cited in Archer, 2010, p. 11) (see Chapter 4).

Data analysis and findings:

1. The Internal Conversation Indicator (ICONI)

Tables 6.2 and 6.3 provide the ICONI data of people's interplay between context and concern at the time of EA implementation. ICONI was used to identify dominant modes of reflexivity.

In tables 6.2 and 6.3 below, EA management terms refer to people who affect (corporate agents) and are affected (primary agents) by EA implementation, and whose institutional structures and positions range from IT Governance Committee, University Architecture Board, and Enterprise Business Groups to Lead Enterprise Architect. End-users (individual actors) are people who can be affected by EA implementation and comprised teaching staff, researchers, students, and administrative staff of the faculties, schools and service centres.

Table 6.2 EA management reflexivity

Stratified model of people	Dominant modes of reflexivity (Context)	Reflexivity concern	
		Subject's ultimate concern	Subject's dominant concern
Corporate agent	Autonomous Reflexive	Communicative concern	Autonomous concern
Corporate agent	Autonomous Reflexive	Communicative concern	Autonomous concern
Corporate agent	Autonomous Reflexive	Communicative concern	No dominant concern
Primary agent	Autonomous Reflexive	Communicative concern	Fractured concern
Primary agent	Autonomous Reflexive and Meta-Reflexive	Communicative concern	No dominant concern
Primary agent	Autonomous Reflexive	Fractured concern	No dominant concern

Table 6.2 shows the dominant mode of reflexivity of people within EA management as autonomous reflexive, which means they have their internal deliberations alone and act upon them. In other words, these people had the freedom to govern or control their own affairs with regard to the EA program, which reassured them that the program would address their concerns. As a result, the autonomous reflexives counted on EA implementation.

Interestingly, one primary agent possessed dual dominant modes of reflexivity (autonomous reflexive and meta-reflexive), yet her internal relation in regard to her position (place, functions, rules, duties, and rights) (see Chapter 4) and career inclined her towards autonomous reflexive, indicating a reliance on the program. A meta-reflexive mode refers to a tendency in people to seek a personal vocation rather than a career, compelled by the need to make a difference, rather than simply meeting their immediate needs and desires.

In Reflexivity Concern, people's "ultimate concerns" are mostly related to communicative concerns. This means their ultimate concerns are about family responsibility and family wellbeing, and are likely to secure positions and careers rather than seeking personal vocations. This communicative concern is dependent on the success of EA implementation for retaining their current positions at work and continuity of their careers. Only one primary agent showed fractured concern, which means siding with the majority to establish a better way of life. In this case, like most of his colleagues, the fractured concern endorsed the EA program.

There were no dominant concerns amongst the EA management population. The majority of corporate agents' concerns were autonomous concerns, which means they were more concerned about their work, career, performance achievements, and financial success. Only one primary agent had a fractured concern. The non-dominant concern condition is likely due to the influence of the EA program being stronger than their personal projects.

Given that the dominant modes of reflexivity context within the EA management population was autonomous reflexive, it can be concluded that the dominant mode of collective reflexivity was collective autonomous reflexive, which means the collective of people in this mode were realistically dealing with the EA program in a way that is consistent with group well-being.

Table 6.3 EA end-users' reflexivity

Stratified model of people	Dominant modes of reflexivity (Context)	Reflexivity concern	
		Subject's ultimate concern	Subject's dominant concern
Individual actor	Meta-reflexive	Communicative concern	Communicative concern
Individual actor	Meta-reflexive	n/a for personal reason	n/a for personal reason
Individual actor	Meta-reflexive	Fractured concern	Autonomous concern
Individual actor	Autonomous reflexive	Communicative concern	No dominant concern
Individual actor	Meta-reflexive	Fractured concern	Fractured concern
Individual actor	Autonomous reflexive	Autonomous concern	No dominant concern

Table 6.3 shows the majority of end-users' dominant modes of reflexivity as meta-reflexive. These people felt EA implementation was "somewhat important" as implementation would not directly impact the way they did things. The other individual actors – autonomous reflexives – viewed the program as "quite important" to their personal projects. This does not mean they refused to adopt the EA program; they just accepted it. The subjects' ultimate concern, which acknowledged EA implementation, shows that: a) communicative concern subjects gave credit to the program; b) like most of their colleagues, the fractured concern subjects agreed with the EA programs; and c) the autonomous concern subjects counted on the program.

Furthermore, the dominant concern for EA end-users was the same as for EA management – non-dominant concern. However, in the case of EA end-users, the condition of non-dominant concern was in all likelihood due to the fruitfulness of EA engagement during implementation, indicative of a successful strategy for engaging with them.

To summarise, since the majority of EA end-users' reflexivity context was meta-reflexive, it would appear that the dominant mode of collective reflexivity is collective meta-reflexive, which means this collective of people considered EA a relational enhancement to the way they were doing things.

2. Reflexive mediation of mechanisms: Placing reflexivity theory within people-focused mechanism

According to Archer (2008), people do not act in uniform ways in the same circumstances, and therefore there was no clear explanation of exactly how people responded to people-focused mechanisms, that is mechanisms that encouraged individual and collective acceptance of EA practices, for instance, how people addressed dealing with these mechanisms, what situations they encountered, what relationships they dealt with, etc.

Reflexivity theory provided an explanation of how personal projects were formed, and how they mediated the structural and cultural constraints and enablements within EA implementation. Hence, it could be argued that reflexivity theory can be used to describe the people-focused mechanisms identified in the MA stage. In clarifying the basic

conditions for identifying people-focused mechanisms, reflexivity theory focused on the micro-micro context of sociocultural (SC) and interactions and social interaction (SI) during Time 2 to Time 3. Figure 6.5 below explains how reflexivity theory mediated the basic conditions of people reflexivity and the social interaction and sociocultural properties that shaped the context and concerns of the people-focused mechanisms.

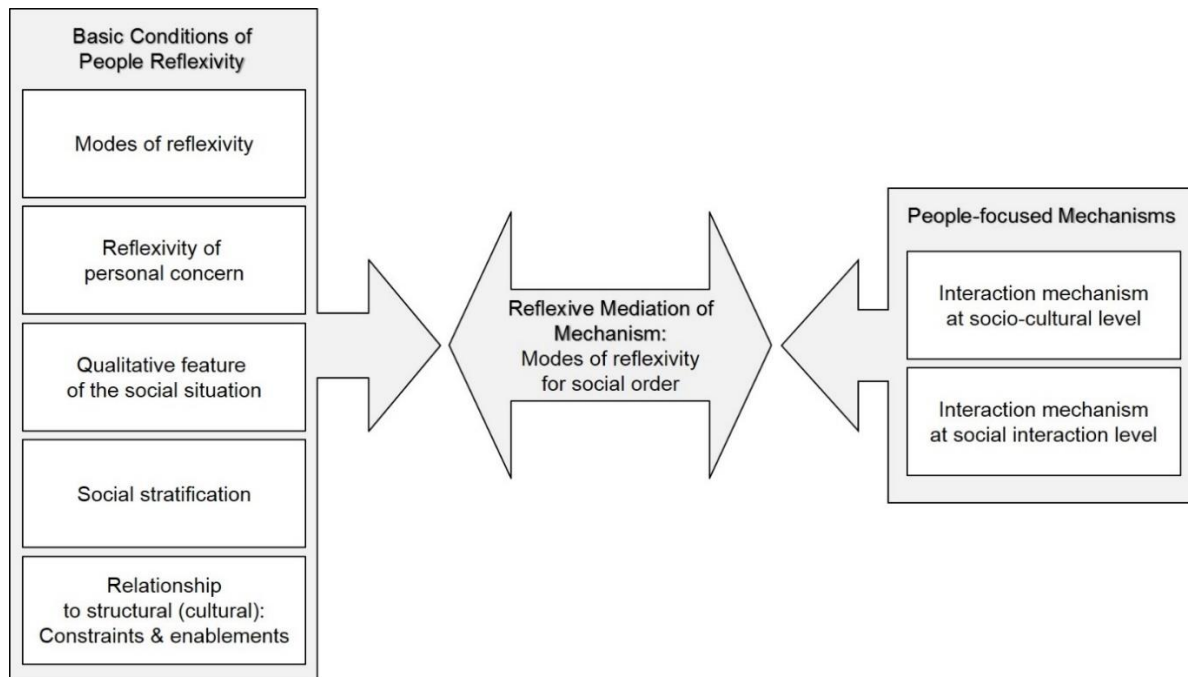


Figure 6.5: Reflexive mediation of mechanisms

At the time of people's interactions, when UX addressed governance of the EA, key factors were the basic conditions of people's reflexivity (Figure 6.5) and the level of detail of people's responses to sociocultural and social interaction. These factors assist in identifying modes of reflexivity for social order or the reflexive mediation of mechanisms. Reflexive mediation ensures that people have the necessary mechanisms in place to enable the architecture transformation. The process for identifying reflexive mediation was as follows:

a) The EA management:

Autonomous reflexive was the dominant mode of reflexivity for corporate agents and primary agents. Corporate agents viewed EA as the foundation for executing architecture transformation at the sociocultural level. Having the freedom to govern

or control their own affairs with regard to the program, the first step at this level was to culturally identify the key players (primary agents) in EA engagement, during which different primary agents (part of stakeholders) may have been uncovered as the engagement progressed through the sectionalism mechanism. Corporate agents viewed EA as a mandatory program to support future university strategies, and this was the condition at the social interaction level. To ensure continuation of the program at UX, corporate agents avoided concentrating too heavily on the formal structure of the university functional areas as the basis of identification through diversification mechanisms, since informal stakeholder groups may be just as powerful and influential as formal ones. The primary agents acted according to their autonomous reflexive mode to realistically deal with the EA program, which allowed them some assurance that the program would address their concerns.

The qualitative feature of the corporate and primary agents' social context is referred to as *contextual discontinuity* (see Table 5.2), since their actions would transform the cultural and social structure. This is predominantly a reflexive action. *Upward mobility* was the social stratification of the corporate and primary agents (see Table 5.2), an agential objective to improve upon their social position, and in doing so, to become upwardly socially mobile. Their relationship to structure and culture was a strategic stance towards constraints and enablements although they had the freedom to govern autonomously. Nevertheless, their ultimate personal concerns made them act in accordance with their moral duty rather than their desires. The corporate and primary agents' ultimate concerns were *communicative*.

To review, the above discussion suggests the mode of reflexivity for the social order was for people to devote themselves to the program and contribute to architecture initiatives and implementation (see chapter 5). This was the reflexive mediation of mechanisms for EA management (corporate and primary agents). According to Archer (2008), this reflexive mediation of mechanisms leads to *morphogenesis* (see Table 5.2). *Sectionalism* and *diversification* were the morphogenetic generative mechanisms.

b) The EA End-users:

Meta-reflexive was the dominant mode of reflexivity for individual actors. These individuals belonged to more than one stakeholder group (i.e. members of faculties, schools or service centres) and tended to arise from specific EA events. As discussed earlier, they viewed EA implementation as “somewhat important” because it did not directly impact the way they were doing things. Some were interested in details of the implementation while others didn’t care. Certain individuals thought the program was too complex for a layperson to understand. For them, EA was not like other systems where they had prior knowledge, and could agree or disagree or make suggestions. Culturally, they were accepting of EA and would not interfere with the program unless implementation conflicted with their interests. Structurally, they considered EA a relational enhancement to the way they were doing things, and they engaged with *sectionalism* and *diversification* mechanisms to ensure consistent governance of their interest and concerns.

The qualitative feature of individual actors in the social context is referred to as *contextual incongruity* (see Table 5.2). While this social situation may conflict with the EA program, the continuous promise of the program’s benefits in enabling them to realise their context, will cause them to acknowledge and trust the EA program. As meta-reflexives they subscribe to one of three social stratifications (see Table 5.2) depending on the social situation: a) social immobility; b) upward mobility; or c) social volatility. However, due to the fruitfulness of EA engagement during implementation, the social stratification of the individual actors was *upward mobility*. Their relationship to structure and culture was subversive towards constraints and enablements since they tended to seek personal vocations rather than careers, compelled by a need to make a difference rather than simply meeting their immediate needs and desires. However, their ultimate personal concerns made them credit the program (*communicative concern*) and agree to embrace it like most of their colleagues (*fractured concern*).

To summarise, the discussion above suggests the modes of reflexivity in the social order was to foster values for social reorientation and develop the organisation

towards social transformation (see chapter 5). This was the reflexive mediation of mechanisms for EA end-users (individual actors). According to Archer (2008), this reflexive mediation of mechanisms leads to *high morphogenesis and low morphostatis* (see Table 5.2), conducive for encouraging individuals' acceptance of EA practices.

6.3.4 'Comparison with different theories/abstractions' stage

Danermark et al. (2002) credited this stage with elaborating and estimating the relative explanatory powers of the mechanisms, structures and cultures described by means of abduction and retroduction. In other words, this stage assesses the relative explanatory powers of the mechanisms and structures in the problem investigated. According to Danermark et al. (2002), one particular theory might describe the necessary conditions for what is to be explained and therefore has greater explanatory power.

In terms of abduction, this study identified the connections and relations between the observable EA events and the identified EA context (the mechanisms and situational logics), and gave new meaning to already known EA events. The interconnections between the EA events and contexts were the events and non-events (see Figure 5.11) located in the actual domain (not directly observable) that generated the already known EA events (the observable EA events). This study explains that those events and non-events were impacted by: a) the social mechanisms that drive large-scale architectural transformation (found in the analysis of MA – analytical resolution stage); and b) the theory or mechanisms built into the EA program (found in the description stage, the empirical domain). However the role of theory and program mechanisms in supporting the social mechanisms proposed by MA was still unknown.

The retroduction stage of the study clarified the basic conditions for social relationships: a) people's actions and interactions; b) people-focused mechanisms; c) reasoning; and d) knowledge that lead to identification of reflexive mediation of mechanisms. Retroduction was instrumental in explaining people's responses to the people-focused mechanisms (mechanisms that encourage individual and collective acceptance of EA practices), and also for clarifying the basic conditions for people-focused mechanisms. Nevertheless, the role of

the program mechanisms, referred to as program measures by Pawson and Tilley (1997), in supporting the people-focused mechanisms underpinning the stakeholders' interactions, were still unknown.

In this study, the purpose of comparing different theories was to uncover the theory of the program mechanisms in order to determine the conditions under which they might work or not, i.e. "what works", "for whom" and "in what circumstance". Pawson and Tilley (1997) suggested an important focus on understanding the theory underlying the program mechanisms to understand and explain EA outcomes. Understanding the theory underlying the program implementation is helpful for deriving the mechanisms by which architecture transformation is achieved or not. Mechanisms are a fundamental part of social realist explanation as they provide the causal possibilities within social programs.

These aims helped to understand some of the mechanisms built into the implementation program, such as the various consultation group mechanisms (i.e. TOGAF: people's roles and actions in the EA program) and the support mechanisms for encouraging frequent input from stakeholders. Given such aims and their associated social focus, the underlying philosophy should clearly represent these elements. It was also important to properly examine the EA program mechanisms in order to fully appreciate the success of the program.

In some EA studies, particularly larger-scale architecture transformations that purely examine technical or business aspects, the program mechanisms were deeply involved in, and perhaps led the EA implementation. In this study, which explored the role of people and the social aspects of EA implementation, the program mechanisms did not substitute the main critical realist theories by which social mechanisms are proposed, but rather supplemented them.

Data analysis and findings:

Eleven program mechanisms (theories) of successful EA implementation were identified in the EA literature (see Chapter 2) as follows:

1. **Individual engagement:** A mechanism that ensures all stakeholders are on board and remain involved along the way, including business people, the IT people on the ground, management, and the end-users (Gartner, 2009; Bente et al., 2012).

2. **Stakeholders' role:** A mechanism that addresses stakeholders' concerns by identifying and refining their requirements through promoting views of the architecture that show how their concerns and requirements will be addressed, as well as showing the trade-offs that will be necessary to reconcile potentially conflicting concerns of different stakeholders (Ross et al., 2006; Gartner, 2009; Anderson & Backhouse, 2009; TOGAF, 2011; Bente et al., 2012; Janssen, 2012).
3. **Governance:** A mechanism that ensures business and IT projects achieve their objectives at: a) companywide level; b) business unit level; and c) project team level (Ross et al., 2006; Anderson & Backhouse, 2009; TOGAF, 2011; Bente et al., 2012; Janssen, 2012).
4. **Linkage:** A mechanism that ensures the architecture reflects and informs the goals and priorities of all parties through: a) architecture linkage; b) business linkage; and c) alignment linkage (Ross et al., 2006).
5. **Collaboration:** A mechanism that ensures the EA program supports new ways of doing business collaboratively with partners and customers. The result is a "multi-entity" ecosystem that allows interaction at more touchpoints and additional depth (Ross et al., 2006; Gartner, 2009; Bente et al., 2012, Janssen & Klievink, 2012).
6. **Communication:** A mechanism that ensures ongoing communication and negotiation between IT and business – why the changes are needed (the motivation); the benefits to be expected from the changes; where the changes are expected to be made and what the expected changes may be. This mechanism also ensures sufficient stakeholder understanding and support (Gartner, 2009; Anderson & Backhouse, 2009; Gravesen, 2012; Bente et al., 2012).
7. **EA compliance:** A mechanism that ensures various important people comply with their associated responsibilities; including people's actions and their relationship to architectural compliance over the period of EA implementation (TOGAF, 2011; Čyras & Riedl, 2012).
8. **EA conformance:** A mechanism that ensures all the features of the EA program are implemented in accordance with the specifications (TOGAF, 2011).
9. **Shared vision:** A mechanism that ensures EA principles, business linkages, baseline and targeted architecture are identified (Janssen, 2012).
10. **Socio-political:** A mechanism that ensures all political aspects such as trust, goodwill, power and mutual interests of stakeholders are embodied in the EA implementation; the

creation of a shared vision, communication amongst stakeholders, and evaluation of the EA impact (Janssen, 2012).

11. **EA Leadership:** A mechanism that ensures the key success factors of communication and team-building are incorporated into the EA program. A good mix of social skills, business focus, IT literacy, and an ability to lead are crucial (Ross et al., 2006; Gartner, 2009; TOGAF, 2011).

Comparison with different theories: What works, for whom, and in what circumstances?

Table 6.4 describes how the program mechanisms map to each CR theory according to the social mechanisms uncovered. This table shows the variety of possible objectives and emphases, and how EA objectives might overlap or conflict with some mechanisms. The diversity of program mechanisms is also reflected in the terminology in the EA literature (Chapter 2).

Table 6.4 Mapping the ‘program mechanisms’ to each of CR theories by which social mechanisms are discovered

No	Program Mechanism	Social mechanisms proposed by:	
		Meta-theory of MA	Reflexivity Theory
1	Individuals’ engagement	Diversification; Opportunism	Sectionalism
2	Stakeholders’ role	Sectionalism; Diversification	Diversification
3	Governance	Sectionalism; Opportunism	Sectionalism; Diversification
4	Linkage	Opportunism; Collaboration	Sectionalism; Diversification
5	Collaboration	Opportunism; Collaboration	Sectionalism
6	Communication	Opportunism; Communication	Sectionalism
7	EA compliance	Opportunism; Collaboration	Sectionalism; Diversification
8	EA conformance	Opportunism; Collaboration	Diversification
9	Shared vision	Opportunism; Communication	Diversification
10	Socio-political	Opportunism; Communication	Sectionalism; Diversification
11	EA Leadership	Opportunism; Communication	Sectionalism; Diversification

Table descriptions – what works, for whom, and in what circumstances:

Table 6.4 elaborates and estimates the EA theories underlying the program implementation (the role of program mechanisms) (see Chapter 2) to support (a) the social mechanisms proposed by MA, and (b) the people-focused mechanisms underpinning the frequent stakeholders' interaction (reflexive mediation of mechanisms). What this verifies is that for EA to work it must be compatible with the observed situational logic. This powerfully supports Archer's argument about what situational logics are important and it also supports the benefit of knowing what situational logics might be in place. The reflexivity mechanism identifies the mechanisms shaping their ultimate concerns – it defines the people focused basis for individual and collective responses.

1. Individuals engagement:

- a) Viewed from MA Meta-theory: This theory fits the diversification mechanism proposed by MA as it acts as an instrument for corporate agents to engage with primary agents and individual actors, which, under social interaction circumstances, ensures alignment of the EA program, whether operationalised locally by the business units or globally by the university. The theory is also suited to the opportunism mechanism as it essentially serves as a mechanism to engage the support of all stakeholders with an interest in or responsibility for EA implementation, to ensure that the university's interests are served and the EA objectives are achieved.
- b) Viewed from reflexivity theory: This theory fits into the reflexivity mediation of people-focused mechanisms (sectionalism) as it describes people's adoption of EA (their actions and interactions) which is culturally shaped by the interplay between people's context and concerns. In other words, people's ultimate concerns are related to sectionalism – the macro-level opportunism encourages the belief that they can benefit their own sectional interests.

2. Stakeholders' role:

- a) Viewed from MA Meta-theory: This theory fits with the sectionalism mechanisms proposed by MA as it focuses on the requirements of users and stakeholders, which

in socio-cultural circumstances, creates a culture of understanding across the university and provides useful insights for EA implementation. This theory is also compatible with diversification mechanisms as it fundamentally focuses on business outcomes, particularly considering that the business of universities structurally requires their members to operate in more than one information domain.

- b) Viewed from reflexivity theory: This theory suggests that different stakeholders with different roles in the system will have different concerns, which in reflexivity mediation of people-focused mechanisms (diversification), is one of the key interests of crucial importance to stakeholders in the EA implementation, and determines the acceptability of the EA.

3. EA governance:

- a) Viewed from MA Meta-theory: This theory works for sectionalism and opportunism mechanisms proposed by MA. In both mechanisms, the theory encourages university-wide participation rather than local objectives. Stakeholders are expected to actively contribute by quantifying their IT demands for the EA program.
- b) Viewed from reflexivity theory: From the reflexivity mediation of people-focused mechanisms (sectionalism and diversification), this theory engages with stakeholders and ensures consistent governance of their interests (context and concerns).

4. Linkage:

- a) Viewed from MA Meta-theory: By nature this theory works on opportunism and collaboration mechanisms proposed by MA. As the theory shows a tangible link between the core strategies of the university and enablement of the EA program. Linkage gives stakeholders opportunities to collaborate in order to achieve synergies across multiple architecture priorities.
- b) Viewed from reflexivity theory: This theory fits with reflexive mediation of mechanisms (sectionalism and diversification), as the linkage mechanisms serve to commit stakeholders to the program and contribute most to architecture initiatives and implementation.

5. Collaboration:

- a) Viewed from MA Meta-theory: Fundamentally, the theory fits with opportunism and the collaboration mechanisms proposed by MA. This theory suggests a “multi-entity” ecosystem that allows interaction by stakeholders at more touchpoints and in more depth, compatible with collaboration mechanisms in dealing with social complex situations as an opportunity to achieve more flexible architecture and an open architecture solution.
- b) Viewed from reflexivity theory: This theory is appropriate for reflexive mediation of mechanisms (sectionalism) as it suggests EA initiatives should be organised into stakeholders’ contexts and concerns in order to identify any initiatives that could hinder implementation. Culturally, reflexive mediation of mechanisms (sectionalism) is used to manage collaboration between the EA program and stakeholders.

6. Communication:

- a) Viewed from MA Meta-theory: This theory articulates that most people in the program attempt to do what they think is right under certain circumstances, but without clear communication some of their actions will do as much harm as good. This is consistent with opportunism and the communication mechanisms proposed by MA in that the main purpose of EA is to communicate the benefits of EA to stakeholders. Opportunism requires a communication plan, covering stakeholders’ interests at all levels of the university’s structure and culture, ranging from an EA initiative to governance.
- b) Viewed from reflexivity theory: This theory ensures ongoing communication and negotiation between IT and business areas about the benefits to be expected, where the changes are expected to be made and what the expected changes may be. This is in harmony with reflexive mediation of mechanisms (sectionalism and diversification) as the mechanisms allow stakeholders to confirm that the program will address their concerns.

7. EA compliance:

- a) Viewed from MA Meta-theory: This theory argues that EA compliance ensures various important people with associated responsibilities are brought together, as well as people's actions and relationships in architectural compliance over the period of EA implementation. It fits with opportunism and the collaboration mechanisms proposed by MA as these mechanisms act as instruments for engaging all stakeholders with an interest in or responsibility for EA implementation, to ensure that the university's interests are served and the EA objectives achieved.
- b) Viewed from reflexivity theory: This theory found that stakeholders' delegation of responsibility for EA implementation can entrench EA within the organisation. In terms of reflexive mediation of mechanisms (sectionalism and diversification), this theory makes people, culturally and structurally, adopt a strategic stance towards constraints and enablements, which can bring compliance to the implementation.

8. EA conformance:

- a) Viewed from MA Meta-theory: This theory fits with opportunism and the collaboration mechanisms proposed by MA as conformance provides an integrated structure for managing EA activities across interest areas by ensuring the architecture is implemented in accordance with the specifications. In terms of MA, stakeholders' acceptance of the inbuilt structures and mechanisms are dependent on EA collaboration and the opportunity to develop a peer-to-peer manner of learning about architecture specification to further assist a peaceful transition to the targeted state.
- b) Viewed from reflexivity theory: This theory focused on managing EA activities across interest areas where ways of doing things may have been impacted. In terms of the reflexive mediation of mechanisms (diversification), it sought stakeholder acceptance and endorsement for conformance as the new structure progressed to support the program. This is consistent with reflexivity theory in identifying people's internal relations leading to successful EA implementation at UX.

9. Shared vision:

- a) Viewed from MA Meta-theory: This theory suggests that EA principles, business linkages, baseline, and targeted architecture be identified through the shared vision mechanism, consistent with opportunism and the communication mechanisms proposed by MA. In terms of MA, opportunism underpinned EA initiatives in identifying the risks associated with the vision for the architecture, and assessed the readiness for IT-business transformation and the potential risks. It emphasised a clear line of sight between technology decisions and business outcomes to provide UX with a unified, targeted architecture for engaging stakeholders and delivering stronger outcomes. Opportunism required a communication plan that covered all the university's cultures and met all stakeholders' needs, ranging from an EA vision to availability of technology infrastructure. Effective communication to the right stakeholders at the right time was critical for successful implementation.
- b) Viewed from reflexivity theory: This theory suggests the initiatives of architectural transformation require effort to bring about structural change that will be accomplished by a shared vision of the social relationship. Social relationship was the basic condition of reflexivity theory for attaining knowledge, in particular about people's internal inclinations towards EA implementation. Once the social relationship was understood, it became possible to define appropriate solutions and rally stakeholders around a common vision and purpose. In terms of the reflexive mediation of mechanisms (diversification), encapsulating an EA vision that is aligned with social conditions is crucial for people interaction and for developing a broad range of different targeted architectures.

10. Socio-political:

- a) Viewed from MA Meta-theory: This theory suggests that targeted architecture influences organisations and people elements (roles and responsibilities) which are politically sensitive. It also claims EA implementation is more politically oriented than technically or business oriented. For instance, EA can serve as a way for the organisation to engage with business-unit projects that might otherwise proceed without involvement in the EA program. In ensuring all political aspects, such as trust,

goodwill, power, and mutual interests of stakeholders are embodied in EA implementation, in terms of MA the process of tailoring stakeholders and their power, influence, and interests provides opportunities to remove obstacles elsewhere in the university. This includes the creation of a shared vision, communication amongst stakeholders, and evaluation of the EA impact.

- b) Viewed from reflexivity theory: This theory explains that, without appropriate political backing, EA implementation is bound to fail. In terms of the reflexive mediation of mechanisms (sectionalism and diversification), sectionalism serves as a solution for understanding the power of people's tendencies to resist the EA program, while diversification identifies key stakeholders, their power, influence and interests, and defines the key business requirements to be addressed by EA. The reflexive mediation of people-focused mechanisms enables understanding of people's particular courses of action (personal concerns) in relation to their social circumstances (context of EA).

11. EA leadership:

- a) Viewed from MA Meta-theory: This theory emphasises teamwork, interpersonal skills and an ability to clearly define and communicate for strategic leadership. EA leadership also requires extensive and substantial practical experience and applied knowledge of the subject. Getting stakeholders to agree on an EA program might otherwise be exponentially tougher, as the program may mean that the university's functional areas (business units) lose discretion over core business processes and sometimes over the people and systems that execute them. This study uncovered (in MA analysis) that the involvement of more people is considerably better than one or two. Their different experiences, knowledge and perspectives led to interesting and insightful debates. Since EA created a shared understanding of how UX would operate, the earlier battles were forgotten and people stopped questioning the value of EA. This occurred because of the leadership role in communicating the EA, since MA recommends communication as a key mechanism for supporting the leadership role. Targeted EA can be achieved by involving theory in addressing challenges of cultural complexity. Opportunism provides communication mechanisms with targeted information to the right stakeholders at the right time.

- b) Viewed from reflexivity theory: This theory suggests that EA leadership is not just about command and execution. The role of leaders is to continually empower people with a vision and execution strategy, and to embed governance elements into EA implementation. In terms of the reflexive mediation of mechanisms (sectionalism and diversification), leadership is broadly shared among stakeholders by adapting to different cultural and structural environments for social reorientation and architectural transformation, which in turn leads to social transformation.

From the above discussion it is clear that the role of program mechanisms is to contribute to CR theories by which social mechanisms are proposed; and to examine how different program mechanisms (EA theories) can support different parts of: a) the social mechanisms proposed by MA; and b) the reflexive mediation of people-focused mechanisms. Understanding the relationship of the mechanisms in both theories is a major concern. In general, theories provide the basis for examining the specific mechanisms to which people respond and ultimately people's adoption of EA, shaped by the interplay between social structures, cultures and people's reflexives. This perspective allows the best mechanism configurations for enabling success of EA programs in the university sector to be revealed, and in University X in particular.

6.4 Domain of Actual

The actual domain describes events that happen, whether we experience them or not. This mid-dimension on the CR ontological map (see Figure 6.1) is part of the real domain. The actual domain incorporates events and non-events which are not experienced (empirical domain), i.e. what happens in the world is not the same as that which is observed (Danermark et al., 2002). In other words, this domain is where key implementation mechanisms produce events and non-events which are not directly observable within the EA events (see Figure 5.11). In identifying events and non-events that are mostly hidden in the actual domain, the method of analysis uses abduction (see abduction stage). Table 6.5 presents the events and non-events produced by the key implementation mechanisms in the abduction stage (section 6.3.2).

Table 6.5 Events and non-events in the domain of actual

Key implementation mechanism	Event of 'Actual Domain'	Non-event of 'Actual Domain'
Communication	<p>1. <i>Diversification management</i>: communication events in making decisions about diversification of business unit roadmap, technology environment, and socio-cultural practices.</p>	<p>2. <i>Strategic alliance</i>: enables the EA to be communicated and understood by all of UX stakeholders, which may allow them to verify that the EA program will address their concerns</p> <p>3. <i>Distributed leadership</i>: communication initiative in engaging individuals at all levels in leading the transitioning the architecture of IT-Business transformation (change) to keeps everyone (the primary agents and individual actors) 'on board' and keeps all focused on the program.</p>
Collaboration	<p>1. <i>Synergy management</i>: collaboration events in coordinating the IT activities of various business units.</p> <p>2. <i>Linkage management</i>: collaboration events in tailoring stakeholders power, influence, and interest to provide the opportunity to remove obstacles that are already carried out elsewhere in the University, thus it can add into EA program specific tasks in aligning the key business requirements</p>	<p>3. <i>Strategic alliance</i>: collaboration initiative to support more detailed definition of a consolidated, cross-business unit roadmap (the University functional area) within the EA program.</p>

6.5 Summary

This chapter provided a thorough description of the research findings from University X's EA implementation and described the analysis between the abstract and the concrete from a CR ontological viewpoint. It concludes with an overview of the three overlapping CR ontological domains to show: a) the generative mechanisms that enabled the success of EA implementation (in the real domain); b) the events and non-events not directly observable within the EA events (in the actual domain); and c) the empirical facts of the UX EA events (in the empirical domain). In terms of social theories this study explains the key implementation mechanisms and social responses underlying successful large-scale architecture transformation in UX. In terms of EA theories it explains the important role of program mechanisms in supporting the CR theories whereby social mechanisms are proposed. Since these are produced by people they can be changed by people. People's invisible internal relations, which made EA implementation at UX succeed, were uncovered through reflexivity theory. To summarise, Figure 6.6 presents the research findings.

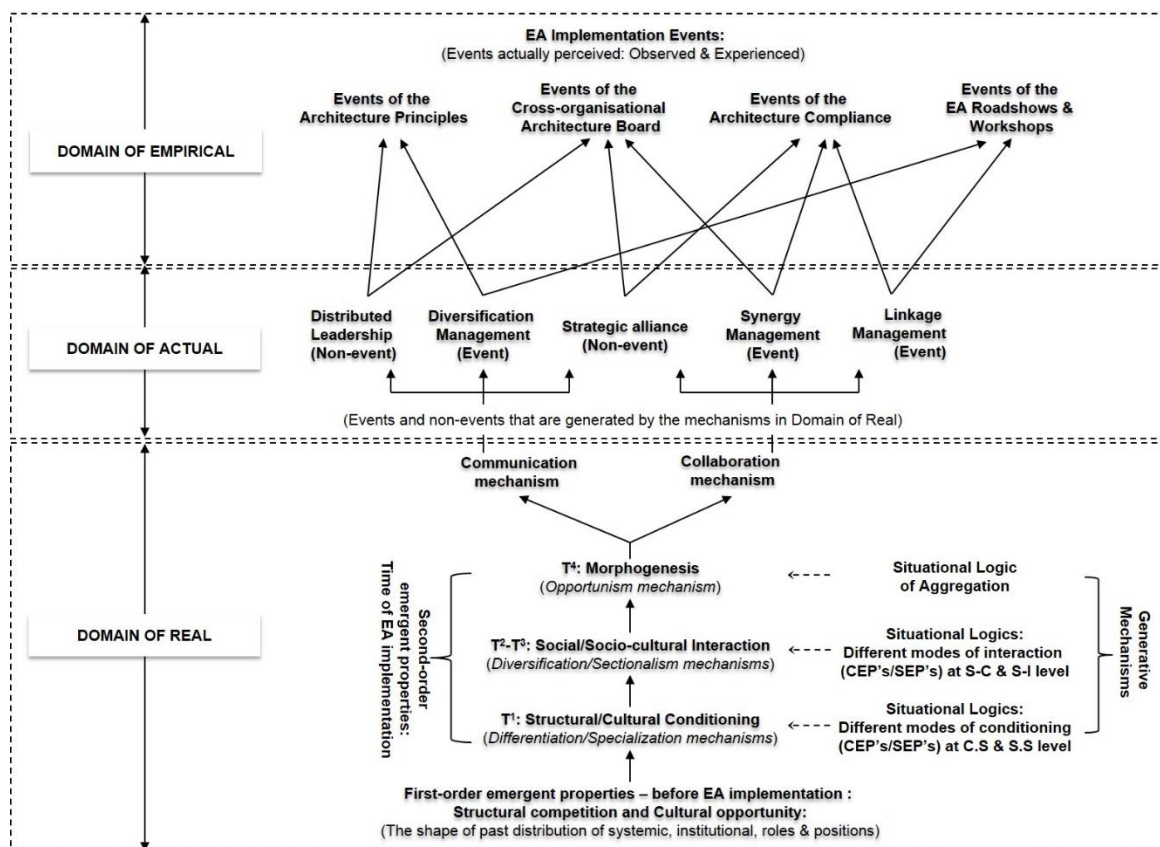


Figure 6.6: Research findings: The relation of three overlapping CR ontological domains in University 'X' EA implementation

The following chapter presents the theoretical and practical implications of the research findings which frame the implications of the research questions presented earlier in the thesis.

CHAPTER SEVEN: DISCUSSION

7.1 Overview

This chapter presents the conclusions from the research findings discussed in the previous chapter by revisiting the initial research questions and objectives of the research. It outlines what was involved in theorising people's adoption of Enterprise Architecture (EA) in relation to the methodological framework. The theoretical implications of current EA implementation trends and emerging social issues offer a contribution to Information Systems (IS) theory and recommendations for EA practice. The following and final sections of this chapter discuss the research limitations and future research directions.

7.2 Research Questions Revisited

In the following sections, the research questions are addressed in reference to the research findings from University X's (UX) EA implementation case analysis. Figure 5.6 shows the related research questions and their objectives, reproduced here for ease of reference. These research questions were addressed using Critical Realist (CR) mechanism-based explanations, and involved theory-oriented accounts of situations in macro–micro–macro contexts including: a) Archer's Morphogenetic Approach (MA) schematic stage – the structure, culture and agency (people) or SCA; and b) reflexivity theory to identify the reflexive mediation of mechanisms constituting people's contexts and concerns within the program.

The macroscopic context explored the interplay between structural and cultural systems and agency, which were intended to uncover the social mechanisms under which the EA program was implemented. Context also explored the program mechanisms (see Chapters 2 and 6) built into the EA implementation and associated with theories gathered from the EA literature review (program mechanisms are explained in the methodological framework implications section). The microscopic context explains the important modes of reflexivity that demonstrated how people responded to the embedded mechanisms of EA implementation. People's reflexive deliberations also formed an important mechanism for explaining how structures and cultures constrained and enabled agents to adopt the program.

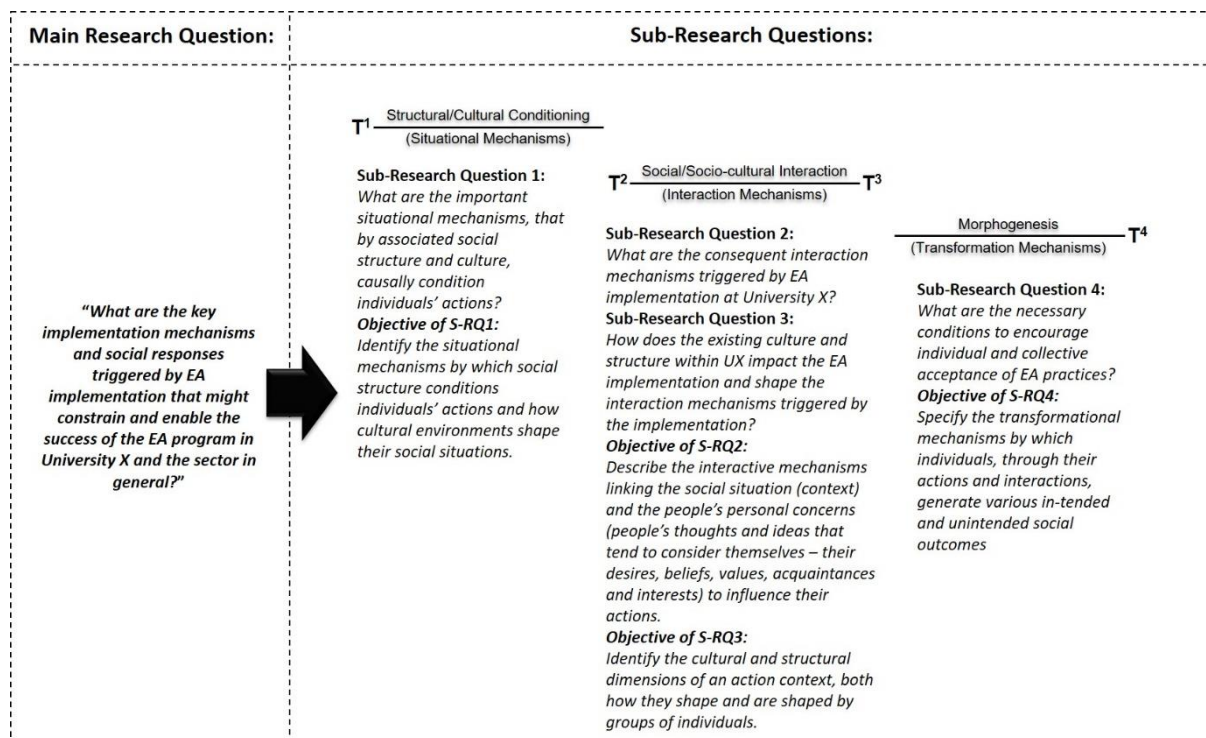


Figure 5.6: The schematic diagram of research questions: The interplay within and between the cycles of social change in morphogenetic approach (adapted from Archer, 1995, pp. 193, 218, 295, and 303)

7.2.1 Sub-research question number 1: Macro – micro context of cultural and structural system

The first sub-research question was: “What are the important situational mechanisms, that by associated social structure and culture, causally condition individuals’ actions?” The research objective was to “identify the situational mechanisms by which social structure conditions individuals’ actions and how cultural environments shape their social situations.” In terms of MA, this sub-research question is located in Time period 1 (see Figure 5.8). The findings of this study revealed that situational mechanisms arose from the results of past sociocultural and social interaction prior to EA implementation (the previous morphogenetic cycle outcomes in the first-order emergent). In other words, Time period 1 was the initial stage of EA implementation (see Figure 6.4) at UX, where the modes of conditioning at structural and cultural levels (macro) predisposed people (micro) to using the IT environment to promote their important projects. It was delineated that the prevailing SL was opportunism (see Figure 6.4). The following discussion addresses the first sub-research question:

1. From a cultural point of view, the analytical history shows that, in the past, an understanding was reached with university stakeholders whereby the most suited members, by virtue of their natural competence, capability, skills, and qualifications – managed the IT environments for their specific business unit activities. At the institutional level, members of the university's functional areas (faculties, schools, and service centres) were shaped and guided by the results of past sociocultural interaction in using the IT environment solely for their own purposes. Archer (1995) called these modes of situational logic **specialization** (Archer, 2015). As per Figure 6.4, specialization is viewed as the act of a business unit making the IT environment suitable for their own purposes. This study viewed specialisation as a situational mechanism of the cultural system because the situational logic of specialisation is a causal power of the cultural system in the social world. Specialization was the legacy mechanism that renders the IT environment suitable for their own interests. Culturally, the outcome of this mechanism created a huge gap between expectations and reality (see Text Box 6.1), and led to poor governance and decision-making caused by localised IT governance.
2. From a structural point of view, the analytical history shows that in the past, the process of addressing markedly different needs lead to differentiating the university's IT environments between one and many (different faculties, schools and service centres), simple and complex (IT activities based on competence and capability of the university's functional areas), and homogeneous and heterogeneous qualifications and skills, changed the IT environment from relatively generalised to functionalised or business-unit owned. At the institutional level, staff in the university's functional areas had been shaped and guided by structural competition as a result of past social interaction in the form of divergence from the IT environment for the sake of convergence in their IT self-organising. This situational logic during the initial stages of EA implementation can be described as **differentiation** (Archer, 1995), creating diversity through unity (Archer, 2013a). This study viewed differentiation as the situational mechanism within the structural system, since the situational logic of differentiation is the generative power of system integration (SEPs) (see Chapter 4) in shaping people's situations within their social systems, institutional structures, roles, and positions. Differentiation carries the underlying mechanism that structurally influences people (agency) synchronically by

constraining and enabling certain agential powers. It was used as an instrument and natural way of determining IT arrangements in the initial stages of EA implementation at UX. It was also the legacy mechanism of the university's functional areas, whereby IT arrangements were made exclusively for their own purposes. Structurally, this mechanism rendered IT at UX difficult to integrate or automate across system boundaries, and resulted in business inefficiencies.

7.2.2 Sub-research questions number 2 and 3: Micro – micro context of socio-cultural and social interaction

Sub-research question 2 (S-RQ2) was: "What are the consequent interaction mechanisms triggered by EA implementation at University X?" with the objective of "describing the interactive mechanisms linking the social situation (context) and the people's personal concerns (people's thoughts and ideas that tend to consider themselves – their desires, beliefs, values, acquaintances and interests) to influence their actions". Sub-research question 3 (S-RQ3) was: "How does the existing culture and structure within University X impact the EA implementation and shape the interaction mechanisms triggered by the implementation?" with the objective of "identifying the cultural and structural dimensions of an action context, both how they shape and are shaped by groups of individuals". In terms of MA, these S-RQs are located in Time 2 to Time 3 (see Figure 5.8) and are related and connected to each other, whereby S-RQ2 bestows meaning on S-RQ3 and vice versa. The S-RQs brings together two CR premises: The Morphogenetic Approach and Reflexivity Theory. Time 2 to Time 3 was the EA implementation period, when interaction between the social and cultural elements shaped and were shaped by groups of individuals within the UX population. The following discussion addresses both of the sub-research questions in terms of MA:

1. At a socio-cultural level (S-C), the corporate agents were looking for solutions to address the lack of architecture initiatives and governance in previous cultural systems (Time 1). It is during this period of time (Time 2 to Time 3) that the PEPs were influenced by corporate agents' preponderance for looking after the interests of particular collectivities (primary agents) and individual actors (EA end-users). Corporate agents' actions in obtaining appropriate political backing and focusing on the rights, roles and equitable treatment of shareholders in the EA program are referred to as the situational logic of

sectionalism (Archer, 1995). In this study, underlying sectionalism was the lack of involvement by appropriate UX stakeholders in the EA program during the initial stages of EA implementation. Sectionalism was the interaction mechanism at the socio-cultural level that enabled an understanding of the power of people's tendency to resist the EA program. Identifying stakeholders' resistance early on led to seeking their input in shaping the architecture, thereby ensuring their support and potentially improving the quality of the EA program by meeting the needs of its users and stakeholders. This mechanism to address sectionalism was built in to the EA program and sought encouragement and university-wide participation rather than serving just local objectives. Addressing the observed Sectionalism at the cultural level sought a culture of understanding across the university of the purpose and benefits of the EA Implementation. The EA "roadshow" was an important element in addressing cultural sectionalism.

2. At a social interaction (SI) level, the PEPs were influenced by corporate agents' endorsement of the EA program at UX through EA events, in order for decisions on technology investment to provide the best outcomes for the university. However, the EA events for the university's functional areas in particular were not as effective as was hoped, due to a misconception about the purpose of the cross-organisational business forums. Some primary agents were under the misapprehension that the forums were just a potential source of funding to do what they wanted to do. Others regarded EA as a waste of time, not beneficial for their business areas and consequently became passive participants. To resolve the ineffectiveness of the EA forums due to a lack of engagement, the corporate agents at UX employed a different model to gain buy-in and acceptance of the EA program. This model engaged people in each of the university's functional areas individually, through a diversification mechanism that ensured alignment between local and global objectives of the EA program. As an interaction mechanism, diversification identified: a) who would gain and who would lose from EA implementation; b) who would make the decisions; c) who would control resources; and d) who had influence. Diversification provided a solution for the diversity of university business activities and its collegial management. In terms of situational logics (Archer, 1995) at the socio-cultural level, the corporate agents' actions in engaging the various stakeholders' interests in the

EA program is called **diversification**. It describes the social situation at the social interaction level: a) between the corporate agents and the collectivities; and b) between the corporate agents and the individuals.

The above discussion addresses the question: “How does the existing culture and structure within University X impact the EA implementation and shape the interaction mechanisms triggered by the implementation?” which leads to determining: “the consequent interaction mechanisms triggered by EA implementation at University X”.

In describing the interaction mechanisms linking the social situation (context) and people’s personal concerns the study used reflexivity theory (see Chapter 6, the retroduction stage). By using the reflexivity investigation tool, ICONI, this theory explained how people reflexively responded to the interaction mechanisms of EA implementation. It also reconstructed their reflexive deliberations (their internal conversations) about adopting the EA. These reflexive deliberations formed an important mechanism for explaining how structure and culture constrained and enabled agents to adopt the program (reflexive mediation of mechanisms) (see Figure 6.5). The following discussion addresses both the sub-research questions in terms of reflexivity theory:

1. ICONI

- a) EA management: This refers to people who affected (corporate agents) and were affected (primary agents) by EA implementation. The dominant mode of reflexivity of the EA management was **autonomous reflexive**. In other words, these players had the freedom to govern or control their own affairs with regard to EA program, which allowed them some certainty that the program would address their concerns. As a result, the autonomous reflexives counted on EA implementation. EA management’s predominant concerns were **communicative concerns**. This means they were ultimately more concerned about family responsibilities and family wellbeing and therefore more likely to secure their positions and careers rather than seeking a vocation. Communicative concern relies on the success of EA implementation to keep their job and maintain continuity of their career. The dominant mode of collective reflexive is **collective autonomous reflexive**, which means this collective

of people deals with the EA program in a way that is pragmatic and focused on the wellbeing of the group.

- b) EA end-users: End-users (individual actors) are those who are affected by EA implementation. The dominant mode of reflexivity for individual actors was **meta-reflexive**. In other words, these people tended to seek vocations rather than a career, compelled by the need to make a difference rather than simply meeting their immediate needs. These end-users felt EA implementation was only somewhat important as it was unlikely to impact directly on their way of doing things. This does not mean they refused to adopt the EA program, they just accepted it. It was evident from end-users' ultimate concerns about EA implementation that a) those with **communicative concerns** gave credit to the program; and b) those with **fractured concerns** went along with the majority of their colleagues. The dominant mode of collective reflexive was **collective meta-reflexive**, which means the collective of people in this mode considered EA a relational enhancement of the way they were doing things.

2. Reflexive mediation of mechanisms

- a) EA management: The qualitative feature of corporate and primary agents within the social situation (context) is referred to as **contextual discontinuity** (Archer, 2008; 2010a), as their actions would transform the cultural and social structure. This is predominantly a reflexive action. **Upward mobility** refers to corporate and primary agents' social stratification. It is an agential aim to improve upon social position, and if successful, become upwardly mobile. Their relationship to structure and culture was to adopt a strategic stance towards constraints and enablements. Despite having the freedom to govern autonomously, their ultimate personal concerns made them act in accordance with their moral duty rather than their own needs and desires. The ultimate concern of corporate and primary agents was **communicative**. Their mode of reflexivity saw them devote themselves strenuously to the program and contribute most to architecture initiatives and implementation. This was the reflexive mediation of mechanisms for EA management (corporate and primary agents). According to Archer (2008), this reflexive mediation of mechanisms leads to

morphogenesis, where **sectionalism** and **diversification** are the generative mechanisms.

- b) EA end-users: End-users engaged with **sectionalism** and **diversification** mechanisms to ensure consistent governance of their interest and concerns. The qualitative feature of individual actors within the social situation or context is referred to as **contextual incongruity** (Archer, 2008; 2010a). This social situation may have been unsuited to the EA program, but as long as there was a continuous promise of the program's benefits for end-users to realise their needs, their predominant reflexive action acknowledged faith in the EA program. As meta-reflexives they subscribe to one of three social stratifications (see Table 5.2) depending on their social situation: a) socially immobile; b) upwardly mobile; and c) socially volatile. However, due to the success of EA engagement during implementation, the individual actors' social stratification was **upward mobility**. Their relationship to structure and culture was subversive towards constraints and enablements as they tended to seek vocations rather careers, compelled by a need to make a difference rather than simply meeting their immediate needs and desires. However, their ultimate personal concerns led them to give credit to the program (**communicative concern**) and to embrace the program like most of their colleagues (**fractured concern**). Their modes of reflexivity signalled a propensity for social re-orientation and social transformation (see Table 5.2). This was the reflexive mediation of mechanisms for EA end-users. According to Archer (2008), this reflexive mediation of mechanisms *leads to high morphogenesis and low morphostatis*, conducive for interaction mechanisms that encouraged acceptance of EA.

The above discussion describes the interaction mechanisms that linked the social situation (context) and people's personal concerns and led to identifying the cultural and structural dimension of actions which shaped and were shaped by the various groups of individuals.

7.2.3 Sub-research questions number 4: Micro – macro context of elaboration

The final sub-research question was “what are the necessary conditions to encourage individual and collective acceptance of EA practices?” Its objective was to “specify the transformational mechanisms by which individuals, through their actions and interactions, generate various intended and unintended social outcomes.”

A number of EA events which occurred during the past period (Time 2 to Time 3) led to Time 4 being approached in a tactically opportunistic way, conscious of policy and practice, yet taking advantage of social events and non-events. The policies and practices of corporate agents’ in ensuring EA compliance with stakeholders’ requirements to provide the best outcomes for the university in the “systemic level” (Archer, 1995) was a consequence of the prevailing situational logic of **opportunism**. The prevailing situational logic consequent from the interaction at the level of ideas suggest opportunism – high systemic integration of UX in the face of sandstone university domination with a correspondingly low social integration where faculties, schools and centres have no interest in each other. This creates opportunism where specialization and sectionalism at the cultural level and differentiation and diversification at the social level (Archer, 1995, pp. 303-304) create opportunities for self-interested newly formed corporate agents. Primary agents reduce since they must take a stance or be left behind.

Opportunism during the period of transformation (Time 4) motivated different forms of strategic actions by predisposing different sections of the UX population to identify their own interests. The process of tailoring stakeholders and their power, influence, and interests, provided an opportunity to remove obstacles that were already in place elsewhere in the university. As opportunism was the transformation mechanism at Time 4, it can be safely concluded that opportunism represents the generative mechanism of morphogenesis and thus this study was able to determine “the transformational mechanisms by which individuals, through their actions and interactions, generated various intended and unintended social outcomes”. Opportunism required that all stakeholders with an interest in or responsibility for EA implementation had to ensure that EA was seen as a platform for supporting their own innovation and opportunities. As the senior EA person points out:

I think [culture] will be the most difficult thing to overcome and I have no illusions about that. I think the most critical thing is for senior executives to continue to support the governance model and hold the line because we'll get a lot of counter argument. And to remind people that the enterprise architecture wasn't developed via IT in isolation, it was developed through discussing and having consultation right across the university about what their current problems were, but also how did they see teaching and learning and research and administration in the future? It's the ability for us to communicate and educate people as to the value of [EA] and we don't sort of talk about it in terms of enterprise architecture, we do talk about having an architectural assessment against our own map and all of that sort of thing, but we think that the organisations not mature enough to really understand enterprise architecture. ...We think that will be a gradual learning maybe over time. We will do it at the senior level, so we will do it at the IT governance committee level.

To be successful EA must focus on supporting the prevailing opportunism evident in the university:

But I think the role of enterprise architecture in that is really about making sure what you're doing is building flexibility and agility to respond. To me, they're just absolutely paramount for that, so making sure that in the technical layers of architecture, that you're building that capability to be flexible and to be able to respond to changes at the business process level... For me, IT governance, or technology governance, is about making sure we're investing in the right things to support the business strategies and objectives, and the enterprise architecture is the thing that tells you what the right things are. It's almost like the decision-making framework for people who have got to make decisions, so I can't turn around and say "well, I actually like this bit of technology or this bit of software."

Providing that UX maintains its strength and solidarity at the systemic level (facing sandstone domination) and allow freedom to diversify at the social level opportunism should continue

as the main situational logic. This is good news for second tier universities. EA provides a strong base for systemic integrity – the success of the program promises a period of advancement as the university makes the most of the opportunities available because of its strong innovative IT. The danger is that if the new structure is not bedded down properly and leads to a war between the various new powers – this would be counterproductive and destroy much of the benefit achievable from an integrated IT platform.

7.2.4 Main research question

The main research question this study sought to address was: “what are the key implementation mechanisms and social responses triggered by EA implementation that might constrain and enable the success of the EA program in University X and the sector in general?”

The findings reveal several different mechanisms were operating simultaneously (during Time 2 to Time 3), the relation between the generative mechanisms (during Time 2 to Time 3) generated the transformation mechanism at Time 4, and their effects were contingent. These contingent effects are also what generated the key mechanisms, called key implementation mechanism in this study.

The MA analysis suggests that: a) Opportunism supported by the EA program required a communication strategy targeting all levels of the university’s culture and structure so that people understood what EA opportunities could be provided (meeting stakeholders’ needs, ranging from an EA initiative to the technology governance). Effective communication to the right stakeholders at the right time was critical. b) Opportunism presented a loose situational logic of opportunity, which then required sociocultural practices to take advantage of it. Rather than addressing challenges of cultural complexity, the corporate agents led the university community’s focus to issues of sharing and sourcing business capability, and exploring new capabilities and ideas. Developing a collaboration plan to address complex social situations presented an opportunity for more flexible and open architecture solutions. Therefore it can be concluded that: a) effective **communication** and **collaboration** were key implementation mechanisms generated by the transformation mechanism (opportunism) at Time 4; and b) the recognition of a need to support the prevailing SL of opportunism was a fundamental key implementation mechanism to drive the architectural transformation at UX.

The findings also revealed that the key implementation mechanisms defined abstractions (during Time 1 to Time 4), representing the structures and cultures within UX at the time of EA implementation, each aimed at a particular context for stakeholders (people) and addressing a particular set of concerns. This is called **social responses** in this study. The social responses triggered by EA implementation were dependent on the interplay between social integration (PEPs) and structural and cultural (SEPs and CEPs) integration (see Chapter 5). In UX people's resistance to change (social integration) was low and structural and cultural integration was high, leading the organisation towards social transformation. This state was appreciated through the mechanisms identified as encouraging individuals' acceptance of EA practices. In terms of MA, the social responses triggered by EA implementation are described as **contingent complementarity** (Archer, 1995), which had a net systemic result of great cultural variety and required that the architecture should be structured to accommodate the business units' cultural differences.

7.3 Research Implications and Contributions

A considerable body of research has sought to understand the social implications of EA programs and their implementation (Boh et al., 2003; Raadt et al., 2008; Gartner, 2009; Gravesen, 2012; Janssen, 2012; Lohe & Legner, 2013). In theorising people's receptiveness to Enterprise Architecture (EA) the adoption of critical realism (CR) has significant implications with respect to the objects investigated, the progress of subsequent research and the outcomes that can be expected as has been demonstrated. Recognising that people-focused mechanisms explain how EA is examined, led to theories that placed mechanisms at the centre of the research to gain an understanding of the social context of EA implementation. This study provides a number of important insights, especially in regard to implementation mechanisms and the social responses that drive large-scale architectural transformations. The usage of Archer's MA has proven to be a valuable tool for understanding the complexity of the university social systems. The social realist tool works perhaps because the University social environment is an open system that intimately reflects the society within which it operates. The social and cultural environment is fluid and mirrors the morphogenetic society of which it is a part. Thus the approach used by Archer and evidenced in her series of books works quite well. It may not work so well in a system that is closed and unchanging.

The following section presents the important implications of the methodological framework, the contribution of theories related to social and technological phenomena in the domain of Information Systems (IS), and recommendations for EA practice to determine successful implementation, use and effects of EA programs in the university sector.

7.3.1 Methodological framework implications

In order to appreciate the importance of CR as a philosophy in the study and identifying the key mechanisms that contributed to the success of EA implementation at University X (UX), this study adopted the framework proposed by Danermark et al. (2002) to guide the methodological framework. The framework is described in five stages (see Figure 5.3, Chapter 5) and has been reproduced here for ease of reference. The following presents the important implications of the methodological framework:

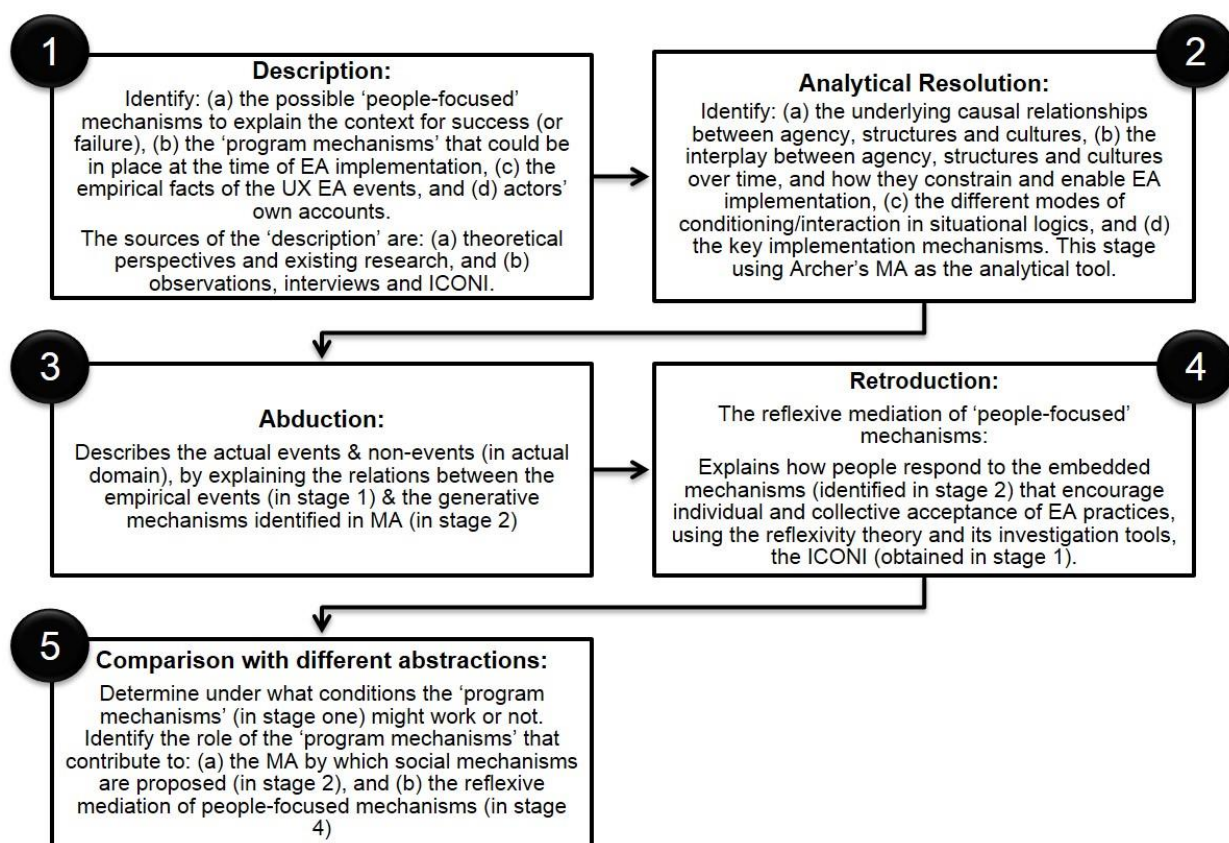


Figure 5.3: The methodological framework of the study (Adapted from Danermark et al., 2002)

1. The first stage of the study explained the often complex and composite events, situations and phenomena by making use of a number of sources like theoretical perspectives, existing research, observations and actors' own accounts among others. This is called the Description Stage. In terms of this study, the framework provides a number of important findings:
 - a) Eleven possible program mechanisms were identified from existing EA research (see Table 2.6, reproduced here for ease of reference).

Table 2.6 Potential Success Program Mechanisms Identified from EA Literature Review

Program Mechanism	Role as a Mechanism	Literature
Individuals' engagement	To ensure that all stakeholders are on board and remain involved along the way - the business people, the IT people on the ground, management and the end-users themselves.	<ol style="list-style-type: none"> 1. Gartner (2009) 2. Bente et al. (2012)
Stakeholders' role	To change stakeholders' perceptions of the architecture by addressing their concerns and requirements; and by identifying the trade-offs that will need to be made to reconcile their potentially conflicting concerns.	<ol style="list-style-type: none"> 1. Ross et al. (2006) 2. Gartner (2009) 3. Anderson and Backhouse (2009) 4. TOGAF (2011) 5. Bente et al. (2012) 6. Janssen (2012)
Governance	To ensure business and IT projects achieve objectives at: a) at companywide level, b) at business unit level, and c) at project team level.	<ol style="list-style-type: none"> 1. Ross et al. (2006) 2. Anderson and Backhouse (2009) 3. TOGAF (2011) 4. Bente et al. (2012) 5. Janssen (2012)
Linkage	To ensure that the architecture reflects and informs the goals and priorities of all parties through: a) architecture linkage; b) business linkage; and c) alignment linkage.	<ol style="list-style-type: none"> 1. Ross et al. (2006)

Program Mechanism	Role as a Mechanism	Literature
Collaborative	To ensure the EA program supports new ways of doing business collaboratively with partners and customers so that the result is a “multi-entity” ecosystem that allows interaction at more touchpoints and in more depth.	<ol style="list-style-type: none"> 1. Ross et al. (2006) 2. Gartner (2009) 3. Bente et al. (2012) 4. Janssen and Klievink, (2012)
Communication	To ensure ongoing communication and negotiation between IT and business centres – why the changes are needed (the motivation), the anticipated benefits, where the changes are expected to be made and what the expected changes may be. This mechanism also assures sufficient stakeholder understanding and support.	<ol style="list-style-type: none"> 1. Gartner (2009) 2. Anderson and Backhouse (2009) 3. Gravesen (2012) 4. Bente et al. (2012)
Compliance	To ensure various important people and their associated responsibilities adhere to architectural compliance over the period of EA implementation.	<ol style="list-style-type: none"> 1. TOGAF (2011) 2. Čyras and Riedl (2012)
Conformance	To ensure all features in the architecture are implemented in accordance with the specifications.	<ol style="list-style-type: none"> 1. TOGAF (2011)
Shared vision	To ensure that EA principles, business linkages, baseline, and target architecture are identified.	<ol style="list-style-type: none"> 1. Janssen (2012)
Sociopolitical	To ensure all political aspects such as trust, goodwill, power, and mutual interests of stakeholders are embodied in the EA implementation, from the creation of a shared vision to communication amongst stakeholders and impact evaluation.	<ol style="list-style-type: none"> 1. Janssen (2012)
Leadership	To understand the importance of communication and team building as key critical success factors. A combination of social skills, business focus, IT literacy, and an ability to lead are crucial to the success of EA programs.	<ol style="list-style-type: none"> 1. Ross et al. (2006) 2. Gartner (2009) 3. TOGAF (2011)

- b) A number of possible people-focused mechanisms were identified from CR theoretical perspectives and existing research (see Table 4.3, reproduced here for ease of reference) to explain the contexts for success or failure.

Table 4.3 Possible social mechanisms identified in the literature

Situational Logic	Social component Level Generative mechanism	Cultural systems	Structural system	Socio-cultural interaction	Social interaction	Tendency Power		Literature
						Morphostatis	Morphogenesis	
Syncretism	Situational mechanism							Archer (1995; 1996)
Compromise	Situational mechanism							Archer (1995)
Unification	Interaction mechanism							Archer (1995; 1996)
Containment	Interaction mechanism							Archer (1995)
Correction	Reproduction mechanism							Archer (1995; 1996)
Pluralism	Situational mechanism							Archer (1995; 1996)
Competition	Situational mechanism							Archer (1995)
Cleavage	Interaction mechanism							Archer (1995; 1996)
Polarisation	Interaction mechanism							Archer (1995)
Elimination	Transformation mechanism							Archer (1995; 1996)
Systematization	Situational mechanism							Archer (1995; 1996)
Integration	Situational mechanism							Archer (1995)
Reproduction	Interaction mechanism							Archer (1995; 1996)
Solidarity	Interaction mechanism							Archer (1995)
Protection	Reproduction mechanism							Archer (1995; 1996)
Specialization	Situational mechanism							Archer (1995; 1996)
Differentiation	Situational mechanism							Archer (1995)
Sectionalism	Interaction mechanism							Archer (1995; 1996)
Diversification	Interaction mechanism							Archer (1995)
Opportunism	Transformation mechanism							Archer (1995; 1996)

- c) Empirical facts of the UX EA events, directly or indirectly observable, were discovered through observation (see Chapter 6, Section 6.2).

- d) People's own accounts of the EA implementation were collected (Primary data: interviews and ICONI data)

This stage provided a useful representation of the empirical facts and data with regard to EA implementation in UX.

2. The second stage was Analytical Resolution in which the Stage 1 representation was resolved using Archer's (1995) morphogenetic approach (MA) as the main defining tool: the empirical material gathered in the first stage was elaborated and analysed in terms of three-part cycles (periods of time), each with relative autonomy and yet interacting with the others. This process determined: a) the relationship between a time prior to EA implementation and the time of EA implementation (the first- and second-order emergent properties); and b) the interplay between and within social structures, culture and agency at the time of EA implementation (second-order emergent properties). These analyses are also called the analytical histories of emergence (Archer, 1995). In terms of this study, this stage represented the deep dimension where important mechanisms that enabled the success of EA implementation were found. Analytical resolution provided a number of important findings:
 - a) Possible underlying causal relationships between people (agency), structure and culture in UX were identified, thus providing an understanding of how UX stakeholders affected and were affected by EA implementation.
 - b) The interplay between agency, structure and culture over time (from Time 1 to Time 4) in UX, and their important mechanisms were identified, thus providing an explanation of how they constrained and enabled EA implementation.
 - c) Different modes of conditioning and interaction in situational logics were identified, providing an explanation of how social situations predispose people towards specific courses of action for the promotion of their own interests.
 - d) Finally, the study identified the key implementation mechanisms and social responses triggered by EA implementation (generated by the transformation

mechanism), which explain the important mechanisms and social responses that propelled such large-scale architectural transformation in UX.

The above approach provided an important link between realist ontology and practical social-IS outcomes, and supplied fundamental consistency to ontology and methodology (see Chapter 5).

3. In the third stage, the framework was used to interpret and redescribe the different components or aspects according to hypothetical conceptual frameworks and theories about structures and their relationships. This stage is referred to as abduction or theoretical redescription, where the original ideas of the object under study are placed in a new context of ideas. In this study, abduction was used to seek connections or relations, not directly observable, between the EA events (Stage 1) and the EA context identified (Stage 2), giving new meaning to already known EA events and providing a number of important findings:
 - a) The study was able to identify the relationship between particular EA events and EA contexts as:
 - a) social situations influenced by activities associated with EA implementation (this is a social circumstance or **event** that occurs whether we experience them or not); and
 - b) social situations influenced by the willingness of UX members to cooperate with each other in order to realise EA implementation (this can be regarded as social cohesion or a **non-event** that occurs whether we experience it or not).
 - b) The study shed light on social situations as **events** and **non-events** located in the actual domain (see Figure 5.11, Chapters 5 and 6) to detect relationships in the new context of EA (see Table 6.1, Chapter 6) and the key implementation mechanisms (identified at the analytical resolution stage of the MA analysis).

Abduction provided useful insights into the actual domain, which was not directly observable within EA implementation. This stage identified three events and two non-events (see Table 6.5, Chapter 6) generated by different mechanisms in Stage 2, thereby producing already known EA events (the observable EA events in Stage 1).

4. The retroduction stage described a mode of inference by which this study arrived at what is characteristic and constitutive of people in adopting EA, since MA (in Stage 2) still posed the central problem of how social structure, culture and agency were actually linked (their social relationship: Archer, 2008). In terms of this study, the retroduction stage allowed clarification of the basic conditions for a social relationship: people's actions and interactions; people-focused mechanisms; reasoning and knowledge within EA implementation. As these basic conditions are not directly observable, the retroduction stage went beyond the empirical (something that can be observed and experienced) by using reflexivity theory (Archer, 2008; 2010a) to uncover people's internal relations and their impact on the success of EA implementation at UX. This stage provided a number of important findings:

- a) The study was able to identify how people subjectively defined their particular courses of action (people's personal concerns) in relation to their objective social circumstances (context of EA) by using the reflexivity investigation tool, ICONI (see Chapter 6).
- b) The study explained how structures and cultures constrained and enabled agents to adopt EA, known as the reflexive mediation of mechanisms in critical realist terms.
- c) The study was able to identify the collective reflexivity or social relationships in EA implementation, thus providing an explanation of people in "special relationships" and how those relationship made them reflexive in a social, instead of a personal way.

Retroduction was instrumental in explaining people's responses to the people-focused mechanisms (mechanisms that encourage individual and collective acceptance of EA practices), and in clarifying the basic conditions for social relationships and the identified mechanisms.

5. This final stage of the research methodology entailed a comparison of different theories and abstractions and estimated the relative explanatory power of the mechanisms and structures. The purpose of the comparison was to highlight the theory of the program

mechanisms (identified in Stage 1) in order to determine the conditions for what works, for whom and in what circumstance. This stage provided a number of important findings:

- a) The study was able to identify the role of program mechanisms that contribute to CR theories by which social mechanisms are proposed.
- b) The study was also able to determine how different program mechanisms support different parts of: i) the social mechanisms proposed by MA; and ii) the reflexive mediation of people-focused mechanisms.

This stage provided the basis for examining the specific program mechanisms by which people responded to the EA program and ultimately their adoption of the program, as shaped by the interplay between social structures, cultures, and people reflexives. It also allowed the study to determine the best mechanism configurations for enabling success of the EA program at University X.

7.3.2 Contributions to information systems theory

“The UK Academy of Information Systems (UKAIS) defines information systems as the means by which people and organizations, utilizing technology, gather, process, store, use and disseminate information” (Ward & Peppard, 2002, p. 3). It is in this domain that the current study was conducted. As explained by Mingers (cited in Ward & Peppard, 2002) “IS [Information Systems] actually is part of the much wider domain of human language and communication, IS will remain in a state of continual development and change in response both to technological innovation and to its mutual interaction with human society as a whole” (p. 3).

Enterprise architecture (EA) operates broadly in the social environment of an organisation and needs to focus on the social rather than being driven solely by the technical aspects of information technology (IT) (Anderson & Backhouse, 2009; Bente et al., 2012; Janssen, 2012). Thus, many social aspects need to be thoroughly analysed, understood and interpreted early in the IT-business transformation. The social aspects of EA are just as important as appreciating the technical aspects in aiding the implementation of EA programs, particularly identifying the people-focused mechanisms that constrain or enable adoption. A social

perspective is necessary to allow for such examination, and should be considered in the early stages of architecture visions, principles and initiatives.

Given the heavy social emphasis of this study, the use of a critical realist perspective in examining people's roles and the social aspects of EA implementation provided an advantageous perspective for theorising and examining the hidden people-focused mechanisms within the IS domain. The use of university X as a case study was well suited to a CR approach for finding explicit causal explanations for the complex social and EA phenomena in the IS field. The following presents the vital role of CR theories in this study and its contribution to existing IS research:

1. The morphogenetic approach (MA)

Previous research has demonstrated use of the morphogenetic approach for explaining EA evolution as the interaction between the existing structural setting (existing EA) and the action of introducing new business or IT capability into an organisation (service-oriented architecture or SOA) (Alwadain, 2014, p. vi). Whilst Alwadain's study is more focused on the relationship between agency (agency seen as an 'action': Alwadain, 2014, p. 116) and structure to understand the nature of change, the emphasis on action and structure has a different central point from this thesis, which emphasises the interplay between structure, culture and agency. The emphasis on agency (people) is important, as Archer (1995, p. 195) suggested people are capable of resisting, repudiating, suspending or circumventing not only the structural tendency, but also the cultural tendency in unpredictable ways because of their creative powers as human beings. These processes of change (or reproduction) are known as generative mechanisms (Archer, 2015).

The present research study was designed to be an in-depth exploration using a completely morphogenetic approach, to make possible an examination of the complex social phenomena of structure, culture and agency in EA implementation. It sees an important role for the morphogenetic approach to identify the hidden mechanisms and situational logics at an ontological depth that is difficult to unveil through other alternative IS and social theories. The study makes an important link between a realist

ontology and practical Social theory in the IS arena, constructing a consistent foundation between ontology and methodology and practical theory.

The findings demonstrate that MA was useful in explaining: a) how the underlying causal relationships between people (agency), social structures, and cultures provide an understanding of how an organisation's stakeholders affect and are affected by EA implementation; b) how the interplay between agency, social structures and cultures over time (from Time 1 to Time 4) and the important mechanisms provide an explanation of how they constrain and enable EA implementation; c) how the different modes of conditioning and interaction in situational logics provide an explanation of how social situations predispose people towards specific courses of action for the promotion of their interests; d) the key implementation mechanisms and social responses triggered by EA implementation. This study therefore makes a valuable contribution to IS literature by demonstrating that MA increases understanding of the causal mechanisms and contexts necessary to achieve positive outcomes in IS research, and in particular an examination of the role of people and their social contexts in EA implementation.

2. Reflexivity theory

This research advances existing theory of how people respond to enterprise-wide IT change. The findings demonstrate the usefulness of reflexivity theory in explaining how personal projects are formed and how they mediate the exercise of structural and cultural constraints and enablements in EA implementation. The findings also show that the reflexivity investigation tool, ICONI, is useful to identify the necessary conditions that encourage individual and collective acceptance of EA practices. In this way, this research represents a unique theoretical contribution to IS theory by advancing our understanding of people's internal conversations (reflexivity theory), which factors are associated with the contexts and concerns of people, and how this leads to their subsequent action or inaction in adopting IS practices.

3. Abduction

Many IS research studies undertaken from a CR perspective, have used abduction as a vital instrument for explaining and proposing creative use of theory in order to derive a

suitable explanation for something that cannot be observed directly (Smith, 2010; Mingers, 2011; Dobson et al., 2013).

This research uses abduction for broadly identifying the events and non-events located in the actual domain (not directly observable). The type of abduction used in this study is **creative abduction** (see Chapter 5), as it applies MA to EA in a way that largely has not been used before. The present findings (see Figure 5.11 and Table 6.1) demonstrate that abduction can be used to identify the interconnections between the empirical domain (observable domain) and the real (perhaps largely non-observable domain - see Figure 6.6). By focusing the lens of abduction in these two domains (the empirical and the real), this research study provides fresh insights into IS literature from a CR perspective.

7.3.3 Recommendations for enterprise architecture practice

Implementing an EA program is a challenging task, since the program is likely to face a complex IT environment that may be inflexible and difficult to manage. More importantly, the program will encounter opposition from stakeholders (people) in often unknown social circumstances (structure and culture). Many EA frameworks and methodologies to date have proposed a detailed model of architectural work products (ranging from business to technology architecture and from governance to change management), including stakeholder management, to overcome the complexities and challenges of EA implementation. These frameworks provide substantial benefits in supporting critical business applications as well as identifying key stakeholders, their concerns and objectives. Nevertheless, the real EA challenges are associated with people issues, as people are capable of affecting and being affected by not only the structural tendencies but also the cultural tendencies within organisations. EA frameworks and methodologies need to address these social and cultural aspects and their interplay with people to properly address potential issues in the architecture implementation.

Implementing an effective EA program means dealing with a prescribed combination of organisation (institution), people (stakeholder), business processes (functional areas) and technology to secure holistic architecture targets. In view of the research findings it is logical to conclude that EA programs need to not only deal with the technical aspects of IT

environments and their systems, but also with people in organisations who use IT to do their business. The social aspects identified in the case study, such as the structural and cultural attributes people bring to an enterprise, demonstrate that a favourable social context can potentially encourage participation in organisation-wide, rather than local objectives, and create a culture of understanding. Key elements are collaboration programs between stakeholders to ensure business and IT projects meet both local and company-wide objectives, and understanding the social aspects of implementation to positively shape how the architecture is presented and communicated to all stakeholders.

To review, this research study allowed a deep examination of the key implementation mechanisms, social responses, and program mechanisms (theory behind the EA implementation) that drive large-scale architectural transformation in the university sector. The case study provided a basis for understanding the contextual factors with the most impact on large-scale transformation efforts in the university sector, and provided an opportunity for proposing ways that existing frameworks and methodologies can more clearly reflect the critical role of people in the change process. This focus help us to understand the social aspects of the enterprise and the IT-business objectives from the viewpoint of people as a key element in EA implementation. They offer a strategic approach to evolving the IT-business environment of the enterprise in a way that deals with the social complexity of the environment and effectively manages the changes in the environment.

7.4 Limitations and Future Research Directions

This research deals with the emergent properties in an analysis of structure, culture and agency (people), in an attempt to bridge the gap between the explanatory powers of practical social IS theories and the ontological strength of a critical realist philosophy. This type of explanation demands the researcher to formulate new ideas about the interconnections between the EA phenomena, unveiled in the theories (abstraction) and the empirical case study (concrete) under observation. The time limit for completion of this study means that the investigation may not be fully realised, as aspects of the EA are still being implemented.

The case example described the challenging university environment and illustrated the important situational logics that directed people's actions within the complex social context

of a university. Although limited to one organisation, the rich data gained from this investigation is expected to be useful for other researchers who wish to develop a better understanding of people as a key element in EA implementation, particularly in the higher education sector.

The concept of people as a key element in EA implementation might lead to a vocabulary useful for examining the overlapping edges between people, processes and technology in IS research. If people do not like the program to be provided by structuring their processes and technologies, they may seek to reject its implementation. As argued by Archer (1995, p. 218) the compatibility or incompatibility of a cultural system with its sociocultural interaction creates a range of possible situational logics which create conditions for social reproduction (morphostasis) or social transformation (morphogenesis). It acknowledges the sociocultural consequences of interactions between the structure and the culture to provide particular situational logics that direct, but do not determine the actions of people. Therefore, it will be interesting for future EA studies to examine organisations where opportunism is not the prevailing logic. As this study indicates that, if EA is presented correctly and implemented with agility in mind, it naturally supports opportunism. In other environments it may well be less suited.

Future EA studies can be suggested in relation to this thesis – either to examine the extent to which situational logics define the mechanisms for change or to generalise the findings beyond the HE sector, or even beyond the EA and IS areas. The premise that people play a key role in successful EA implementation has the potential to change the way EA implementation is approached in future. It is therefore important in future EA studies to examine possible people-focused mechanisms in different organisations, as their interplay between and within the structure and culture ultimately lead them to adopt the EA program or not. The use of Archer’s morphogenetic approach along with reflexivity theory will further help develop our understanding of how the key stakeholders (and their power, influence and interests) may constrain and enable EA implementation. By including reflexivity as an important mechanism, organisations will be in a better position to understand the role of people and their interactions with pre-existing structures and cultures operating over different time periods - reflexivity suggesting that “people” always have the possibility to do

otherwise than expected, largely dependent on their personal history and their current personal projects and ultimate concerns.

7.5 Summary

In summary, the thesis has described how the underlying social realist philosophy and theories helped to address the research questions. The critical realist methodology and its most recognised methodological complement, the morphogenetic approach (MA), has added to our understanding of EA phenomena from a social perspective. This study has developed a connecting theory by building a theoretical explanation of the role of people as a key element in EA implementation, notably in the university sector. In linking the critical role of people to the relations of three overlapping critical realist ontological domains and the important mechanisms involved in EA implementation, this middle range theory has brought together two CR premises (the morphogenetic approach and reflexivity theory) in its analysis, and added to the body of knowledge using an in-depth case study to uncover EA phenomena and their social implications.

CHAPTER 8: CONCLUSION

Implementing the enterprise architecture (EA) program is not just architecting the technical aspects of Information technology (IT) or redesigning the organisational business transformation towards change. It has also to do with interpreting the organisational structural and cultural towards change. EA practices require a widespread support from its stakeholders and need to be actively engage in the complex social contexts in which they exist. In an Australian university case sample, the findings show that opposition and conflict around EA implementation were not about IT but the social complexity surrounding the architecture that described situations boiled down to people issues. Several interviews were held with the senior staff responsible for the program. As explained by a senior level person responsible for the program:

... technology in itself doesn't solve anything, ... [it] is really about people. [...], in the past [we] haven't always recognised that, and that's certainly been the case I think here when I first came here.

[Implementing the EA program is] just a matter of [people] engagement.

... If I look at the executive, probably fifty-fifty there – fifty percent of them get [EA], and also if you talk to individuals nobody would deny if you say to them that you need technology to do what you do. Nobody will argue with that, but then that understanding of why we've got to do enterprise architecture to make sure that happens is not necessarily there.

Understanding the social context of EA can help an enterprise to understand the real challenges associated with people issues, not only the structural constraints and enablements but also the importance of cultural norms within the organisation.

Underpinned by a critical realist perspective, the thesis demonstrates that the MA (Archer, 1995; 1996; 2013a; 2015) is a powerful analytical tool to uncover the hidden mechanisms (the situational logics of structures and cultures) and social responses that enable successful EA implementation. The research examines the particular situational logics evident within the

University under study and how these provide opportunities and constraints to the acceptance of EA over time.

EA is a means of enabling informed decision-making on IT-business transformation as well as ensuring compliance with EA governance. The social complexity surrounding the architecture is a function of the number of stakeholders involved; the variety of concerns, socio-political dimension, diversity in their backgrounds, and work culture that brings complex behavioural attributes into the governing of EA program and its implementation (Op 't Land et al., 2009; Bente et al., 2012; Janssen, 2012). Being organisation wide with a strong governance element, the main changes to University X (UX) consequent from the new EA has significant social implications and social dependence, as indicated by the senior EA person:

I think the main change will be about the governance and investment in technology, so who makes the decisions? I think that will be one of the major changes, which I think needs to be a balance of education, so that's probably more the people side – [it] is really educating people about the value of EA and getting them to understand it and then communicating and keeping the linkages between the enterprise architecture and the business of the university. I think that's really important, but I think the biggest one is who makes those decisions and how the decisions are made. Because in the past, decision-making about our investment in technology has been extremely ad hoc and there's been no formal process for doing it.

So I think, once again it will probably be people like heads of school, faculty heads and directors of service centres who in the past may have been able to make decisions based on their own specific needs in their area.

Governance is part of the implementation because if you haven't got the governance, how do you make sure people stay on the path?

If we don't have governance to get to the endpoint, people will still be making decisions in silos and you'll never get to the endpoint, because part of the EA is to have that roadmap to... well, you've got that "this is what we want to look like and these are things we've got to do to get there." If we

don't totally focus on those things and if we have other people making decisions that actually could undermine that, then we'll just be going round in circles.

...to me, you don't separate enterprise architecture and governance – one without the other is useless. So the [Enterprise Business Groups] are part of the governance framework and that's probably the major [collaboration] mechanism to encourage the commitment to enterprise architecture, supported by our planning prioritisation program to assist with all our governance processes.

The prevailing situational logic consequent from the interaction at the level of ideas suggest **opportunism** (Archer, 1995) – high systemic integration of UX in the face of sandstone university domination with a correspondingly low social integration where faculties, schools and centres have no interest in each other. As the senior member points out:

It's interesting because even though I say it's an interesting culture in the university and it is quite different to an organisation's, there are some similarities. And one of those is the tension between what is seen as corporate and what is seen as operations, and in a university, you would see that as academia and research, and corporate is these people who set all the rules and all of that sort of stuff. And there's always that tension, it's a "them and us". How do you take away the "them and us"? That's why I think the academic reorganisation [separate to EA program] was a really good move because that decision-making is being done by the operations of the university now. There's some ownership and accountability for those decisions, so the people who sit in the Operations area can't say "'they' made a decision that I don't agree with, that affects my life'" sort of thing, because the 'they' is them!

The MA analysis suggests that opportunism supported by the EA program required a **communication** strategy targeting "all levels of the university's culture and structure" so that people understood what EA opportunities could be provided:

...we don't communicate [EA] as talking about enterprise architecture so much. We do talk about [EA] when we say that's the thing that underpins our decisions and all that sort of thing, and we talk about [EA] in plans in simple terms of saying "we need to build a house, we need a plan. We're building a capability here and we need a plan to build a capability." So we talk about [EA] in those terms, but I think more clearly understood in terms of governance and linking the programs that we're doing to the achievement of business objectives and the current problems or inadequacies.

The EA was presented and communicated as a tool for achieving organisational business goals. The EA actually became a collaboration platform for supporting Opportunism – the situational logic of opportunity. The EA is owned by the business and provides a platform for **collaboration** via flexible and open architecture solutions:

One of the difficulties in a university is that there is not a lot of concept about end-to-end process, so not a lot of concept about where your process goes across different areas of the university, the siloed areas. And when we map processes now that's part of, I guess, our education across the university of saying that your process actually doesn't finish here, it continues on, and we need to think about the impacts of what you're doing here on here... Forget about what systems you've got, what are your processes? And what data do you need to capture for compliance purposes or whatever purpose you need to capture that data for. Then we can look at the gap between what you're saying there and what we've got in those systems. And that's like the blueprint for us to implement whatever we implement in the future. It hasn't been driven from the top down [in the past] because there's still not a lot of understanding that you need to actually do that. The thinking's there at the executive level because they do think about "well, should that be done across in Student Services?" That sort of high-level thinking's there, but the understanding that "really what we should do, we need to sit down and we really need to map what those processes are across the university, and then [decide] ..."

Reflexivity theory (Archer, 2007; 2010a) was important in attaining knowledge and understanding about what it is about people's internal relations that makes EA implementation succeed. The idea is that people reflexively accept or reject constraints depending on their personal projects, and that is a big part of social realism. The findings demonstrate the usefulness of reflexivity theory in explaining how personal projects are formed and how they mediate the exercise of structural and cultural constraints and enablements in EA implementation. The senior member agreed with the potential benefits of reflexivity:

Yes, if we can tap into [reflexivity theory], that makes [EA implementation] a lot easier. Too much of the autonomous [reflexives] is where we'll find the problem.

This thesis offers organisations a means to focus on the deeper issues of EA implementation programs by understanding the social complexity surrounding the architecture. The university under study is evidence that recognising enterprise architecture as an organisation-wide initiative with a strong social context is a necessary approach. As indicated by the senior EA member at the completion of EA program:

I think that [people] will always be related to that thing we were talking about before, about universities being a collective of individuals that don't necessarily all have the same focus, enterprise focus. When you're doing enterprise architecture it's about the enterprise, so getting people to understand that the thing I might want to have is not necessarily the best for the whole university, and sometimes I might have to compromise because it's better for the university rather than a benefit for me as an individual. So I think that will be our ongoing biggest challenge.

EA is intimately linked to the prevailing situational logic both in terms of the final product (the role of governance) and in terms of the process of first implementation. It can only succeed if the prevailing logic is understood and taken note of in the program. This thesis suggests that for EA to be successful it must become a platform for supporting the particular situational logic that is in place. EA cannot hope to change a situational logic since that is the

consequence of an analytical history of cultural and structural interaction. Therefore, for EA to be successful it must perhaps be in line with the prevailing logic – in the case of this thesis the importance of linking to opportunism is argued. It is argued that UX's success of EA both in terms of the implementation and in terms of the ongoing governance role was largely because it supported opportunism. The situational logic, along with the MA and reflexivity provided a powerful means for explaining the complex adoption process.

REFERENCES

- Alwadain, A. S. (2014). *A Model of Enterprise Architecture Evolution*. Retrieved January 2016 from Queensland University of Technology:
http://eprints.qut.edu.au/71204/1/Ayed%20Said%20A_Alwadain_Thesis.pdf
- Alwadain, A., Fielt, E., Korthaus, A., & Rosemann, M. (2013). A critical realist perspective of enterprise architecture evolution: Preliminary findings. In *Proceedings of the 24th Australasian Conference on Information Systems*, (p. <http://eprints.qut.edu.au/65202/>). Melbourne, Australia.
- Anderson, P., & Backhouse, G. (2009). *Unleashing EA: Institutional Architectures and the value of joined up thinking*. Retrieved March 2014 from JISC Enterprise Architectures Group Pilot – Intelligent Content Ltd: Technology & Standards Watch (TechWatch): <http://www.jisc.ac.uk/techwatch>
- Archer, M. (1979). *Social Origins of Educational Systems*. London, UK: Sage.
- Archer, M. (1988). *Culture and Agency: The Place of Culture in Social Theory*. Cambridge, UK: Cambridge University Press.
- Archer, M. (1989). Theory, culture and post-industrial society. *Sociologia: Revista di Scienza Sociali*, 1 n.s.
- Archer, M. (1995). *Realist social theory: the morphogenetic approach*. Cambridge, UK: Press Syndicate of the University of Cambridge.
- Archer, M. (1996). *Culture and agency: The place of culture in social theory, Revised Edition*. Cambridge, UK: Press Syndicate of the University of Cambridge.
- Archer, M. (2003). *Structure, Agency and the Internal Conversation*. Cambridge, UK: Cambridge University Press.
- Archer, M. (2007). *Making Our Way Through The World: Human Reflexivity and Social Mobility*. Cambridge, UK: Cambridge University Press.
- Archer, M. (2008). *The Internal Conversation: Mediating Between Structure and Agency [Full Research Report: ESRC End of Award Report, RES-000-23-0349]*. Swindon, UK: ESRC.
- Archer, M. (2010a). Routine, Reflexivity, and Realism. *Sociological Theory*, 28(3), 272-303.
- Archer, M. (2010b). Reflexivity. *Sociopedia.isa*, 1-13.
- Archer, M. (2013a). *Social morphogenesis*. Netherlands: Springer Netherlands.

- Archer, M. (2013b). Reflexivity (updated version). *Sociopedia.isa*: DOI: 10.1177/205684601373, 1-14.
- Archer, M. (Ed.) (2014). *Late Modernity: Trajectories towards Morphogenic Society*. Lausanne, Switzerland: Springer International Publishing Switzerland.
- Archer, M. (Ed.) (2015). *Generative Mechanisms Transforming the Social Order*. Coventry, UK: Springer International Publishing Switzerland.
- Archer, M., Bhaskar, R., Collier, A., Lawson, T., & Norrie, A. (1998). *Critical realism: Essential*. London, UK: Routledge.
- Astbury, B., & Leeuw, F. L. (2010). Unpacking Black Boxes: Mechanisms and Theory Building in Evaluation. *Journal of Evaluation*, 31(3), 63-381.
- Bass, T., & Mabry, R. (2004). Enterprise architecture reference models: A shared vision for Service-Oriented Architecture. In *Proceedings of the IEEE – MILCOM* (pp. 1-8). Monterey, CA, USA: IEEE.
- Benson, R., Bugnitz, T., & Walton, W. (2004). *From Business Strategy to IT Action*. Hoboken, New Jersey, USA: John Wiley & Sons, Inc.
- Bente, S., Bombosch, U., & Langade, S. (2012). *Collaborative Enterprise Architecture: Enriching EA with Lean, Agile, and Enterprise 2.0 Practices*. Waltham, United States of America: Elsevier Inc.
- Best, A., Greenhalgh, T., Lewis, S., Saul, J., Carrol, S., & Bitz, J. (2012). Large-System Transformation in Health Care: A Realist Review. *The Milbank Quarterly*, 90(3), 421-456.
- Bhaskar, R. (1989). *Reclaiming Reality: A Critical Introduction to Contemporary Philosophy*. Brooklyn, New York, USA: Verso.
- Bhaskar, R. (1978). *A realist theory of science*. Sussex: Harvester Press.
- Blom, B., & Morén, S. (2011). Analysis of Generative Mechanisms. *Journal of Critical Realism*, 10 (1), Equinox Publishing Ltd.
- Bloomberg, J. (2014). *Is Enterprise Architecture Completely Broken?* Retrieved November 2016 from Forbes: <https://www.forbes.com/sites/jasonbloomberg/2014/07/11/is-enterprise-architecture-completely-broken/#7a4d7f2a3710>
- Blundel, R. (2007). Critical realism: a suitable vehicle for entrepreneurship research? In Neergaard, Helle, & Ulhøi, *Handbook of Qualitative Research Methods in Entrepreneurship* (pp. 49–74). Cheltenham: Edward Elgar.

- Boh, W. F., Yellin, D., Dill, B., & Herbsleb, J. D. (2003). Effectively managing information systems architecture standards: An intra-organization perspective. *In Proceedings of the International Conference on Information Systems 2003: MISQ Special Issue Workshop: Standard Making: A Critical Research Frontier for Information Systems* (pp. 171-187). Seattle, USA: MISQ.
- Brown, G. (2009). The ontological turn in education: The place of the learning environment. *Journal of Critical Realism*, 5(1), 5-34.
- Bunge, M. (2003). *Emergence and convergence: Qualitative Novelty and the Unity of Knowledge*. Toronto, Canada: University of Toronto Press.
- Bygstad, B. (2010). Generative mechanisms for innovation in information infrastructures. *Information and Organization*, 20 (2010), 156-168.
- Bygstad, B., & Munkvold, B. (2011). In search of mechanisms. Conducting a critical realist data analysis. *In Proceedings of the 32nd International Conference on Information Systems*. Shanghai, China: AIS Electronic Library (AISeL).
- Carayon, P. (2006). Human factors of complex sociotechnical systems. *Applied Ergonomics* 37 (2006), 525–535.
- Carlsson, S. A. (2005). Developing Information Systems Design Knowledge: A Critical Realist. *The Electronic Journal of Business Research Methodology*, 3(2), 93-102.
- Carlsson, S. A. (2006). Towards an Information Systems Design Research Framework: A Critical Realist Perspective. *In Proceedings of the First International Conference on Design Science in Information Systems and Technology (DESIST 2006)* (pp. 192-212). Claremont, CA: Claremont Graduate University.
- Carlsson, S. A. (2011). Critical Realist Information Systems Research in Action. In M. Chiasson et al. (Eds.), *Researching the Future in Information Systems* (pp. 269-284). Turku, Finland: Springer.
- CAUDIT. (2013). *The CAUDIT Enterprise Architecture Commons for Higher Education*. Retrieved April 2014 from www.caudit.edu.au: <https://www.caudit.edu.au/EA-Framework>
- Čyras, V., & Riedl, R. (2012). Formulating the Enterprise Architecture Compliance Problem. *In Proceedings of the Tenth International Baltic Conference on Databases and Information Systems* (pp. 142-153). Vilnius, Lithuania: CEUR Workshop Proceedings (CEUR-WS.org) .
- Danermark, B., Ekström, M., Jakobsen, L., & Karlsson, J. C. (2002). *Explaining Society: Critical realism in the social sciences*. London, UK: Routledge.

- de Vaujany, F. (2008). Capturing reflexivity modes in IS: a critical realist approach. *Information and Organization*, 18(1), 51-72 .
- Demetriou, C. (2009). The Realist Approach to Explanatory Mechanisms in Social Science: More than a Heuristic? *Philosophy of the Social Sciences* 39(3), 440-462.
- DET. (2007). *National Code of Practice for Registration Authorities and Providers of Education and Training to Overseas Students*. Retrieved October 2013 from Department of Education and Training : https://internationaleducation.gov.au/Regulatory-Information/Education-Services-for-Overseas-Students-ESOS-Legislative-Framework/National-Code/Documents/National_Code_2007.rtf.
- Dobson, P. J. (2001a). The philosophy of critical realism—an opportunity for information systems research. *Information Systems Frontiers*, 199-210.
- Dobson, P. J. (2001b). Longitudinal case research: A critical realist perspective. *Systemic practice and action research*, 14(3), 283-296.
- Dobson, P. J. (2003). *Moving from interpretivism to critical realism in IS research : an exploration and supporting IT outsourcing example*. Retrieved June 2014 from Edith Cowan University: <http://ro.ecu.edu.au/theses/1287>
- Dobson, P. J. (2009). Critical Realism as an Underlying Philosophy for IS Research. In M. Khosrow-Pour, *Encyclopedia of Information Science and Technology, Second Edition* (pp. 806-810). Hershey, PA, USA: IGI Global.
- Dobson, P., Jackson, P., & Gengatharen, D. (2011). Examining Rural Adoption of Broadband – Critical Realist Perspective. In *Proceedings of the 15th Pacific Asia Conference on Information Systems*. Brisbane, Australia: AIS Electronic Library (AISeL).
- Dobson, P., Jackson, P., & Gengatharen, D. (2013). Explaining Broadband Adoption in Rural Australia: Modes of Reflexivity and the Morphogenetic Approach. *MIS Quarterly*, 37 (3), 965-992.
- Doucet, G., Gøtze, J., Saha, P., & Bernard, S. (2008). Coherency Management: Using Enterprise Architecture for Alignment, Agility, and Assurance. *Journal of Enterprise Architecture*, 4(2008), 9-20.
- Eason, K. (2014). Afterword: The past, present and future of sociotechnical systems theory. *Applied Ergonomics*, 45 (2014), 213-220.
- Ertaul, L., & Rathod, V. (2012). The Zachman Framework, the Owner's Perspective & Security. In *the 2012 International Conference on Security and Management (SAM'12)* (pp. 1 - 6). Las Vegas, USA: <http://www.mcs.csueastbay.edu/~lertaul/SAM9731.pdf>.

- Fleetwood, S. (2005). The ontology of organisation and management studies: A critical realist approach. *Organization*, 12 (2), 197-222.
- Fleetwood, S. (2013). *What is (and what isn't) critical realism? [PowerPoint Slides, presented on CESR seminar]*. Retrieved September 2015 from UWE Bristol (University of the West of England): <http://www2.uwe.ac.uk/faculties/BBS/BUS/Research/CESR/What%20CR%20is%20and%20is%20not.pdf>.
- Fox, S. (2009). Applying critical realism to information and communication technologies: a case study. *Construction Management and Economics*, 27(5), 465-472.
- Franke, U., Hook, D., Konig, J., Lagerstrom, R., Narman, P., Ulberg, J., . . . Ekstedt, M. (2009). EAF2 – A framework for categorizing EA frameworks. In *Proceedings of the 10th ACIS International Conference on Software Engineering, Artificial Intelligences, Networking and Parallel/Distributed Computing* (pp. 327-332). Washington, DC, USA : IEEE Computer Society .
- García-Ruiz, P., & Rodríguez-Lluesma, C. (2010). 'Reflexive consumers': a relational approach to consumption as a social practice. In M. Archer (Ed.), *Conversations About Reflexivity* (pp. 223–242). London, UK: Routledge.
- Gartner. (2009). *Gartner Identifies Ten Enterprise Architecture Pitfalls*. Retrieved June 2013 from <http://www.gartner.com/>: <http://www.gartner.com/newsroom/id/1159617>
- Gaver, S. B. (2010). *Why doesn't the federal enterprise architecture work? An examination why the federal enterprise architecture program has not delivered the expected results and what can be done about it*. Retrieved June 2013 from The process platform for E-Government Switzerland: http://www.ech-bpm.ch/sites/default/files/articles/why_doesnt_the_federal_enterprise_architecture_work.pdf
- Gengatharen, D., Standing, C., & Knight, S. (2009). Knowledge Management in an Organisational Climate of Uncertainty and Change: A Longitudinal Case Study of an Australian University. In *Proceedings of the 20th Australasian Conference on Information Systems* (pp. 1076-1085). Melbourne: ACIS & Monash University.
- Godinez, M., Hechler, E., Koenig, K., Lockwood, S., Oberhofer, M., & Schroeck, M. (2010). *The Art of Enterprise Information Architecture*. Boston, MA, USA: IBM Press (Pearson plc).
- Gravesen, J. K. (2012). *Reasons for resistance to enterprise architecture and ways to overcome it*. Retrieved June 2013 from IBM Corporation: The Developer works: <http://www.ibm.com/developerworks/rational/library/enterprise-architecture-resistance/enterprise-architecture-resistance-pdf.pdf>

- Gustafsson, J. (2017). *Single case studies vs. multiple case studies: A comparative study (Dissertation)*. Retrieved from Halmstad University:
<http://urn.kb.se/resolve?urn=urn:nbn:se:hh:diva-33017>
- Hedström, P., & Ylikoski, P. (2010). Causal Mechanisms in the Social Sciences. *Annual Review of Sociology*, 36(2010), 49-67.
- Hedström, P. (2005). *Dissecting the Social. On the Principles of Analytical Sociology*. Cambridge, UK: Cambridge University Press.
- Hedström, P., & Bearman, P. (2009). *The Oxford handbook of analytical sociology*. Oxford, UK: Oxford University Press.
- Horrocks, I. (2009). Applying the morphogenetic approach: outcomes and issues from a case study of information systems development and organisational change in British local government. *Journal of Critical*, 8(1), 35-62.
- Janssen, M. (2012). Sociopolitical Aspects of Interoperability and Enterprise Architecture in E-Government. *Social Science Computer Review*, 30 (1), 24-36.
- Janssen, M., & Klievink, B. (2012). Can enterprise architectures reduce failure in development projects? *Transforming Government: People, Process and Policy*, 6(1), 27-40.
- Janssen, M., & Madsen, K. (2007). Analyzing enterprise architecture in national government: The case of Denmark and the Netherlands. In *Proceedings of the 40th Hawaii International Conference on System Sciences*. Waikoloa, Hawaii: IEEE Computer Society.
- Johnston, R., & Smith, S. (2008). How critical realism clarifies validity issues in theory-testing research: analysis and case. In D. Hart, & S. Gregor, *Information Systems Foundations: The Role of Design science* (pp. 21-47). Canberra, Australia: ANU E Press (The Australian National University).
- Joint Information Systems Committee [JISC]. (2008). *Enterprise Architecture an Introduction. Briefing Paper*. Retrieved March 2013 from JISC Enterprise Architectures Group Pilot – Intelligent Content Ltd.: www.jisc.ac.uk/enterprisearchitectures
- Joint Information Systems Committee [JISC]. (2009a). *HE in FE: E-Assessment in Wales*. Retrieved March 2013 from JISC Enterprise Architectures Group Pilot – Intelligent Content Ltd.: www.jisc.ac.uk/enterprisearchitectures
- Joint Information Systems Committee [JISC]. (2009b). *Doing enterprise architecture: Enabling the agile institution*. Retrieved from JISC Enterprise Architectures Group Pilot – Intelligent Content Ltd.: www.jisc.ac.uk/enterprisearchitectures

- Joint Information Systems Committee [JISC]. (2010). *Enterprise architecture: An introduction, Version 2. Briefing Paper*. Retrieved March 2013 from JISC Enterprise Architectures Group Pilot – Intelligent Content Ltd.: www.jisc.ac.uk/enterprisearchitectures
- Kaidesoja, T. (2009). Bhaskar and Bunge on Social Emergence. *Journal for the Theory of Social Behaviour*, 39(3), 300-322.
- Kawulich, B. B. (2005). *Participant Observation as a Data Collection Method*. Retrieved November 2016 from Forum: Qualitative Social Research: <http://www.qualitative-research.net/index.php/fqs/article/view/466/996>
- Land, M., Proper, E., Waage, M., Cloo, J., & Steghuis, C. (2009). *Enterprise Architecture: Creating Value by Informed Governance*. Berlin, Germany: Springer-Verlag Berlin Heidelberg.
- Lange, M., & Mendling, J. (2011). An Experts' Perspective on Enterprise Architecture Goals, Framework Adoption and Benefit Assessment. In *Proceedings of the 15th IEEE International Enterprise Distributed Object Computing Conference Workshops* (pp. 304-313). Helsinki, Finland: IEEE Computer Society.
- Lankhorst, M. (2009). *Enterprise Architecture at Work: Modelling, Communication and Analysis, Second Edition*. Berlin, Germany: Springer-Verlag Berlin Heidelberg.
- Leist, S., & Zellner, G. (2006). Evaluation of current architecture frameworks. In *Proceedings of the 2006 ACM symposium on Applied computing* (pp. 1546-1553). Dijon, France: ACM Digital Library.
- Lindlof, T., & Taylor, B. (2002). *Qualitative Communication Research Methods, Second Edition*. Thousand Oaks, CA.: Sage Publications.
- Lohe, J., & Legener, C. (2013). Overcoming implementation challenges in enterprise architecture management: A design theory for architecture-driven IT management (ADRIMA). *Information Systems and e-Business Management*, 12(1), 101-137.
- Luckett, K. (2012). Working with 'necessary contradictions': a social realist meta-analysis of an academic development programme review. *Higher Education Research & Development*, 31(3), 339-352.
- Madsen, K. (2006). Enterprise Architecture Implementation and Management: A Case Study on Interoperability. In *Proceedings of the 39th Hawaii International Conference on System Sciences* (pp. 1-10). Kauai, HI, USA.: IEEE Computer Society.
- Manzo, G. (2010). Analytical Sociology and Its Critics. *European Journal of Sociology (Archives Européennes de Sociologie)*, 51(1), 129-170.

- Martin, R., Purao, S., & Robertson, E. (2009). Evolving enterprise architecture. *In Proceeding of the 15th International Conference on Concurrent Enterprising (ICE): ICEIMT Workshop at ICE 2009 - Next Generation Enterprise Architecture* (pp. 1-12). Leiden , the Netherlands: ICE.
- Mason, K., Easton, G., & Lenney, P. (2013). Causal Social Mechanisms; from the what to the why. *Industrial Marketing Management*, 42 (2013), 347-355.
- Mayntz, R. (2004). Mechanisms in the Analysis of Social Macro-Phenomena. *Philosophy of the Social Sciences*, 34(2), 237-259.
- McCarthy, R. (2006). Toward a Unified Enterprise Architecture Framework: An Analytical Evaluation. *Issues in Information Systems*, VII(2), 14-17.
- Mingers, J. (1995). What is the distinctive nature and value of IS as a dicipline. *Systemist*, 17(1), 18-22.
- Mingers, J. (2004). Real-izing information systems: critical realism as an underpinning philosophy for information systems. *Information and Organization*. 14. , 87-103.
- Mingers, J. (2011). *Explanatory Mechanisms: The Contribution of Critical Realism and Systems Thinking/Cybernetics*. Retrieved April 2016 from Kent Business School (Working Paper Series): https://kar.kent.ac.uk/26306/1/Explanatory_mechanisms_sent_Web.pdf
- Mingers, J., Mutch, A., & Willcocks, L. (2013). Critical Realism in Information Systems Research. *MIS Quarterly*, 37(3), 795-802.
- Morén, S., & Blom, B. (2003). Explaining Human Change: On Generative Mechanisms in Social Work Practice. *Journal of Critical Realism*, 2(1), 37-60.
- Morse, J. (Ed.) (2010). *Determining Sample Size*. Retrieved from Qualitative Health Research: http://www.rcsi.ie/files/research/docs/20151204041457_MorseQual-Health-Res2000.pdf
- Mueller, T., Schuldt, D., Sewald, B., Morisse, M., & Petrikina, J. (2013). Towards inter-organizational Enterprise Architecture Management - Applicability of TOGAF 9.1 for Network Organizations. *In Proceedings of the 19th Americas Conference on Information Systems* (pp. 1-13). Chicago, Illinois, USA: Association for Information Systems (AIS).
- Mutch, A. (2007). Reflexivity and the Institutional Entrepreneur: A Historical Exploration. *Organization Studies*, 28(07), 1123-1140.
- Mutch, A. (2010). Technology, Organization, and Structure—A Morphogenetic Approach. *Organization Science*, 21(2), 507-520.

- Nash, R. (1999). What is real and what is realism in sociology? *Journal for the Theory of Social Behaviour*, 29(4), 445-466.
- Nuryatno, E. T., & Dobson, P. (2016). Examining the social aspects of Enterprise Architecture Implementation: A Morphogenetic Approach. In *Proceedings of the 26th Australasian Conference on Information Systems 2015* (pp. 1-10). Adelaide, Australia: University of South Australia & Cornell University Library: ISBN# 978-0-646-95337-3.
- Op 't Land, M., Proper, E., Waage, M., Cloo, J., & Steghuis, C. (2009). *Enterprise Architecture: Creating Value by Informed Governance*. Utrecht, The Netherlands: Springer-Verlag Berlin Heidelberg.
- Oxford Dictionaries. (2015a). *sectionalism*. Retrieved August 2015 from Oxford University Press: <https://en.oxforddictionaries.com/definition/sectionalism>
- Oxford Dictionaries. (2015b). *diversification*. Retrieved August 2015 from Oxford University Press: <https://en.oxforddictionaries.com/definition/diversification>
- Patton, M. (1990). *Qualitative evaluation and research methods*. Beverly Hills, CA: Sage
- Pawson, R., & Tilley, N. (1997). *Realistic Evaluation*. London, UK: SAGE Publications Ltd.
- Pawson, R., & Tilley, N. (2004). *Realist Evaluation: The Magenta Book Guidance Notes. Strategy Unit Cabinet Office, UK*. Retrieved from Community Matters: http://www.communitymatters.com.au/RE_chapter.pdf
- Pawson, R., Wong, G., & Owen, L. (2011). Known Knowns, Known Unknowns, Unknown Unknowns: The Predicament of Evidence-Based Policy. *American Journal of Evaluation* 32(4), 518-546.
- Pettersen, K., McDonald, N., & Engen, O. (2009). Rethinking the role of social theory in socio-technical analysis: A critical realist approach to aircraft maintenance. *Journal Cognition, Technology and Work*, 12(3), 181-191.
- Raadt, B., & Vliet, H. (2008). Designing the enterprise architecture function. In *Proceedings of the 4th International Conference on the Quality of Software-Architectures, QoSA 2008, LNCS 5281* (pp. 103-118). Karlsruhe, Germany: Springer-Verlag Berlin Heidelberg.
- Raadt, B., Schouten, S., & Vliet, H. (2008). Stakeholder perception of enterprise architecture. In *Proceedings of the European Conference on Software Architecture (ECSA 2008), Springer LNCS 5292* (pp. 19-34). Paphos, Cyprus: Springer-Verlag Berlin Heidelberg.
- Radulescu, C., & Vessey, I. (2008). Causality in Critical Realist Research: An Analysis of Three Explanatory Frameworks. In *Proceedings of the Annual Conference of International*

- Association for Critical Realism* (pp. 4-41). London, UK: The International Association for Critical Realism (IACR).
- Roeleven, S. (2010). *Why Two Thirds of Enterprise Architecture Projects Fail: An explanation for the limited success of architecture projects*. Retrieved from <http://www.cio.com.au/>: <http://www.cio.com.au/whitepaper/370709/why-two-thirds-of-enterprise-architecture-projects-fail/download/>
- Ross, J., Weill, P., & Robertson, D. (2006). *Enterprise Architecture as Strategy: Creating a foundation for business execution*. Boston, Massachusetts, United State of America: Harvard Business School Press.
- Saha, P. (2009). *Advances in Government Enterprise Architecture*. New York: Information Science Reference (IGI Global).
- Saha, P. (2013). *A Systemic Perspective to Managing Complexity with Enterprise Architecture*. Hershey, PA: Business Science Reference (IGI Global).
- Sayer, A. (1992). *Method in Social Science: A Realist Approach*. London, UK: Routledge.
- Schekkerman, J. (2004). *How to Survive in the Jungle of Enterprise Architecture Frameworks, Second Edition*. Bloomington, Indiana, USA: Trafford Publishing.
- Schekkerman, J. (2009). *Enterprise architecture tool selection guide version. 5*. Retrieved February 2013 from <http://www.enterprise-architecture.info/>: <https://www.enterprise-architecture.info/documents/Enterprise%20Architecture%20Tool%20Selection%20Guide%20v6.3.pdf>.
- Scherer, S., & Wimmer, M. (2011). Reference framework for E-participation projects. *In the Proceedings of the Third IFIP WG 8.5 international conference on Electronic participation* (pp. 145-156). Delft, The Netherlands: Springer-Verlag Berlin, Heidelberg.
- Searle , J. (1995). *The Construction of Social Reality*. New York, USA: Free Press.
- Sembiring, J., Nuryatno, E. T., & Gondokaryono, Y. (2011). Analyzing the indicators and requirements in the main components of EA methodology development using grounded theory in qualitative methods. *In Proceedings of the 2011 Conference on Interdisciplinary Business Research: Society of Interdisciplinary Business Research* (p. <http://dx.doi.org/10.2139/ssrn.1867875>). Bangkok, Thailand: SSRN.
- Sessions, R. (2007). *A comparison of the top four enterprise architecture methodologies: 12 criteria for comparing and evaluating enterprise IT architectural methodologies*. Retrieved November 2012 from ObjectWatch, Inc.: <http://msdn.microsoft.com/en-us/library/bb466232.aspx>

- Smith, M. L. (2010). Testable theory development for small-N studies: Critical realism and middle-rangetheory. *International Journal of Information Technologies and Systems Approach*, 3(1), 41-56.
- Spragg, N. (2015). *How Does Enterprise Architecture Help [PowerPoint Slides]*. Lecture. Edith Cowan University.
- The Open Group Architecture Framework [TOGAF]. (2011). *TOGAF® Version 9.1: Evaluation Copy*. Retrieved December 2013 from The Open Group:
<https://www2.opengroup.org/ogsys/jsp/publications/PublicationDetails.jsp?catalogno=g116>
- Turban, E., Leidner, D., McLean, E., & Wetherbe, J. (2008). *Information Technology for Management: Transforming Organizations in the Digital Economy, 6th Edition*. Singapore: John Wiley & Sons. Inc.
- Urbaczewski, L., & Mrdalj, S. (2006). A comparison of enterprise architecture frameworks. *Issues in Information Systems*, 7(2), 18-23.
- Van Den Berg, M., & Van Steenbergen, M. (2006). *Building an Enterprise Architecture Practice: Tools, Tips, Best Practices, Ready-to-Use Insights*. Dordrecht, The Netherlands: Springer.
- Vandenberghe, F. (2008). *Archer's Structure, Agency and the Internal Conversation [Lectures - Recensions]*. Retrieved January 2016 from Journal du MAUSS:
<http://www.journaldumauss.net/?Structure-Agency-and-the-Internal>
- Wad, P. (2001). *Critical realism and Comparative Sociology (Paper presented in the 5th Annual IACR Conference, 17-19 August 2001, Roskilde University, Denmark)*. Retrieved July 2016 from www.criticalrealism.com:
http://www.criticalrealism.com/archive/iacr_conference_2001/pwad_crcs.pdf
- Wan, P. Y. (2012). Analytical Sociology: A Bungean Appreciation. *Science and Education*, 21(2012), 1545–1565.
- Ward, J., & Peppard, J. (2002). *Strategic Planning for Information System: Third Edition*. Chichester, West Sussex, England: John Wiley & Sons, Inc.
- Watkins, J. (1998). *Information Technology, Organizations and People: Transformations in the UK Retail Financial Services*. London: Taylor & Francis Ltd.
- Wegmann, A., Kotsalainen, A., Matthey, L., Regev, G., & Giannattasio, A. (2008). Augmenting the Zachman Enterprise Architecture Framework with a Systemic Conceptualization. *In Proceedings of the 12th IEEE International EDOC Conference*. München, Germany: IEEE.

- Wright, D. (2013). *UniAttend: A process automation case study*. Retrieved August 2013 from Leonardo Consulting:
<http://hosted.verticalresponse.com/1463407/c67ea782d1/577600059/96d1dc6609/#UniAttend>
- Wynn, D., & Williams, C. (2008). Critical realism-based explanatory case study research in information systems. *In Proceedings of the 29th International Conference on Information Systems* (pp. 2-19). Paris, France: Association for Information Systems (AIS).
- Wynn, D., & Williams, C. (2012). Principles for Conducting Critical Realist Case Study Research in Information Systems. *MIS Quarterly*, 36(3), 787-810.
- Ylimäki, T., & Halttunen, V. (2006). Method engineering in practice: A case of applying the Zachman framework in the context of small enterprise architecture oriented projects. *Information Knowledge Systems Management* 5 (2005/2006), 189–209.
- Zachariadis, M., Scott, S., & Barrett, M. (2013). Methodological implications of critical realism for mixed-methods research. *MIS Quarterly*, 37(3), 855-879.
- Zachman, J. A. (1987). A framework for information systems architecture. *IBM Systems Journal*, 26(3), 276-292.
- Zachman, J. A. (2008). *The Zachman Framework*. Retrieved November 2016 from Zachman International - Enterprise Architecture: <https://www.zachman.com/about-the-zachman-framework>
- Zarvi'ci, N., & Wieringa, R. (2006). An integrated EA framework for business-IT alignment. *In proceedings of the CAISE*06 Workshop on Business/IT Alignment and Interoperability* (pp. 262-270). Luxemburg, Germany: BUSITAL '06.