Enterprise Systems Enabled Organisational Change; A Qualitative Critical Realist Approach on Organisational Routines Dynamics

A thesis submitted to The University of Manchester for the degree of

Doctor of Philosophy

In the Faculty of Humanities

2016

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LIST OF ABBREVIATION

ANT: Actor Network Theory
AST: Adaptive Structuration Theory
BI: Business Intelligence
BPM: Business Process Management
BPR: Business Process Reengineering
CR: Critical Realism
CRM: Customer Relationship Management
CSF: Critical Success Factors
DCR: Dialectical Critical Realism
ECM: Enterprise Content Management
ERP: Enterprise Resource Planning
ES: Enterprise System
HCI: Human Computer Interaction
HRM: Human Resource Management
HR: Human Resource
IS: Information System
IT: Information Technology
KPI: Key Performance Indicator
MRP: Material Resource Planning
SCM: Supply Chain Management
SME: Small and Medium Enterprises
SCM: Supply Chain Management
SOA: Service Oriented Architecture
STS: Socio Technical Systems
TF: Theoretical Framework
ABSTRACT

The pace of IT-driven change and innovation and its increasing contribution to business transformation has been a major source of attention and spending in many industries and according to Gartner (2016), total worldwide IT expenditure is estimated $3.5 Trillion in 2016 which is around 5 percent of the worldwide GDP. Enterprise System application is considered as one of the main business solution which companies adopt for process efficiency and the whole supply chain effectiveness. Enterprise Systems (ES) improve organisational dynamic capabilities and change the way organisations do business by transforming organisational routines.

According to Volkoff et al (2007), various researches on ES organisational change has taken deterministic approaches (Institutional Theory) to explain such changes and it is suggested that greater value should be derived from studying the process of change rather than the idiosyncratic outcomes. Adopting variety of social constructivist approaches such as structuration theory (Giddens 1984), tend to focus on the action of agents, ignoring the technology, or in Actor Network Theory (ANT) (Latour 2005), technology is often treated as a concrete object, ignoring each technology’s distinctive characteristics.

In order to analyse how change, unfold in organisations considering ES applications, this research, developed a conceptual theoretical framework which maps ES application/technology and organisational routines dimensions on the stratified ontology of Critical Realism. In this regard, the theoretical consideration for this research is methodologically and philosophically driven. From epistemological dimension this research through a narrative research strategy on organisational change and stability (Vaara et al 2016; Saunders et al 2016) explores the relationship between various organisational routine dimensions through identifying generative mechanisms. Generative mechanisms are considered as important elements in Critical Realism philosophy and consequently in CR driven field studies. This research aligned the concept of Affordances (Gibson 1977, 1979) with generative mechanisms (Volkoff & Strong 2013) and explores the dynamic of organisational routines through the logic of retroduction (Sudabby 2006). The empirical data has been collected from ES vendors and particularly ES Designers, System Analysts, ES Architects and Business Developments, which design, architect and facilitate ES adoption by organisations.

A relational approach (Stoffregen 2003; Sayer 2010; Leonardi 2011; Kane et al. 2011) towards ES Affordances and Organisational Routines has been considered and justified. The analysis and findings are centred to enhance understanding on the nature of ES from relational affordances and explore systemic view on change and stability which is considered as a postmodern approach towards change, through influence and interplay of ES in organisational routines dynamics.

This research has attempted to contribute to three main domains of knowledge which are overlapped and intertwined (Bakerville & Wood-Harper 1998). The development of conceptual theoretical framework is the main theoretical contribution of this research. Methodologically this research has been done with a lens of CR and Narrative Inquiry (as a solid research strategy) and Retroduction as a logic and mode of inquiry and analysis in an epistemological sense. The combination of different components of methodology is unique in theorising ES enabled Change. From a practical contribution point of view, this research could potentially inform industry practitioners (both ES vendors and Organisations) on level of change and stability regarding the chosen ES [features] and can facilitate the decision-making process accordingly.

Keywords: Enterprise System Artefact, Organisational Change, Organisational Routines, Relational Affordances, Sociomateriality, Socio-Technical System Design.
DECLARATION

I hereby declare that no portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

Sohrab
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ACKNOWLEDGMENTS

I’m doing what I love to do, and I do owe it, lots of it, to my family, to Manchester to the community, to my friends, and to the professors and academics for believing in me. And I know although this chapter is going to end, there are seeds that I have in the ground with everyone and connections that, at a given point, will flower. And that flower is going to be beautiful.

I would like to wholeheartedly thank Professor Trevor Wood-Harper my main supervisor who with his deep knowledge in IS and System Thinking field and years and years of experience of Doctoral supervision has inspired me during the whole stage of my PhD and guided my research with his insightful comments and feedback. I believe our weekly dialogue and discussion on various topics and research concerns underpinned by autonomous learning atmosphere shaped my critical thinking. I am very happy to acquire this frame of mind and level of knowledge as I believe I can contribute to the society in an effective way! Thank You Trevor.

I thank, Professor Dong-Ling Xu my second supervisor for her well-balanced guidance on the first year of my studies and also facilitating some of the interviews of my research and introducing me to people in the software industry.

I would like to take this opportunity to thank Professor Peter Kawalek, the internal examiner of this PhD thesis, who with his deep knowledge of strategy and information system examined this thesis and his invaluable feedback and comments in the viva session is much appreciated. The discussion and feedback in the Viva session on the conceptual framework and philosophical discussion on information system and “Critical Realism” by the external examiner of this thesis, Professor Andrew Basden is greatly appreciated.

I wholeheartedly thank my supportive, beautiful and intelligent family for their continuous support in all stages of my life and without their emotional and financial support; I would have not been able to finish this PhD. As the last member of the family, I always benefitted from every member of the family. My Father (Dr. Esmail Moshiri) who is my role model and is my first teacher and I always learn from him, my Mother (Fatemeh) who always
passionately loves me and support me emotionally, my intelligent Brothers (Siamak & Siavash) who guide me professionally in all of the stages of my life, my sweet sister (Solmaz) and Payam my brother in law who know me more than anybody else and I always get the best advice from them. Thank you my wonderful family!

Special thanks to Melanie my girlfriend who makes Manchester my home and has been with me during the difficult times and obviously the good times! Thank You Lovely Mel, I can see a bright future together. XX

I take this opportunity to thank academics, PhD colleagues and supportive staffs at Innovation, Management & Policy (IMP) and People, Management and Organisation (PMO) division at Alliance Manchester Business School for their continuous support and help throughout the whole 4 years of my PhD studies at University of Manchester.
DEDICATION

This thesis is dedicated to my wonderful family for all of their financial and emotional support and most importantly for their being. This PhD would not have been possible without their encouragement and conscious and subconscious guidance throughout the whole stages of my life.

Sohrab
1. **CHAPTER ONE – INTRODUCTION**

1.0. **Introduction**

The pace of IT-driven change and innovation and its increasing contribution to business transformation has been a major source of attention and spending in many industries. According to Gartner (2016), total worldwide IT expenditure is estimated $3.5 Trillion in 2016 which is around 5 percent of the worldwide GDP.

While current business landscape has been driven by many challenges and opportunities, organisations are constantly looking to ways they can exploit (IS/IT) Technology for efficient and effective business delivery, maintain growth and create business value. In this environment, business leaders are demanding to see the relationship between IT investment and their businesses output (Rao & Mandal, 2012).

Enterprise System (ES) application is considered as one of the main business solution which companies adopt for process efficiency and the whole supply chain effectiveness. Implementing an ES supposes to bring unrivalled advantages to business process management (BPM) and efficient flow of information.

Information Technology (IT) in general and Enterprise Systems (ES) in particular improve organisational dynamic capabilities and competitive advantage and changes the way organisations do business by transforming organisational routines (Teece & Pisano 1994, Teece 2012a, Teece 2012b, Teece 2014).

Hagen & Sinn (2012) argue that, ES can bring unintended (not necessarily negative) micro-level organisational changes. Bernroider et al (2014) in their study on ES implementation argue that, ERP (Enterprise Resource Planning) applications facilitate the relationship between dynamic pre-adoPTION capabilities and ERP enabled organisational change. Wagner and Newell
(2006) also indicate, on the significance of ERP systems by companies as it is being implemented to facilitate organisational change process.

Czarniawska (2008) indicates that, technology in general and ES in particular, “makes organising durable”. The significant growth in ES applications may be explained by their proclaimed benefits. ES allows an organisation to implement fully integrated systems to replace its legacy systems, which are extremely difficult to maintain because of their age, size, mission-critical status, and frequent lack of documentation (Robey et al 2002).

Robey et al (2002) argue that, implementation of ES packages are often associated with more fundamental organisational improvement efforts, such as Business Process Reengineering (BPR). Indeed, the primary benefits of an ERP installation may result from new business processes, organisational structures, human resource skill requirements, and knowledge management.

ERP application adoption and implementation is considered as the main IT investment which companies have been making during the past decade and surely it has cost them large amount of resources. According to Rao & Mandal (2012), large organisations started implementing ES and it is now being adopted by medium and small enterprises (SMEs).

The scope of ERP systems has been started from integration of the business processes in the company and has been expanding to inter-enterprise integration with a focus on Supply Chain Management (SCM) (Gunasekaran et al 2009).

Although academic and industry practitioners admit to the significance of ES applications which enable organisational change and make organisations durable and more competitive, however the ES projects show significant failure. Abdel-Kader & Nguyen (2011) argue that, ERP implementation by organisations show mixed results, varying from successful implementation to considerable failures by many enterprises and also partial success and failure.

According to Finney (2011), there has been a considerable amount of research on critical success failure (CSF) factors of ERP implementation and this topic is regarded as one of the popular topics in information system literatures in the past decade. The main cause for the popularity of research in CSF of ERP
implementation is the belief that the degree of understanding of various success factors will increase the chance of smooth and successful implementation.

It is argued that, before engaging with management of change, research needs to consider and explore in further the nature of change which is brought by ES applications. In this regard, a background of research in terms of exploring the ways to study ES applications and organisational change will be presented in the following section.

1.1. Research Background

Significance of ES for majority of contemporary organisations has been discussed in the previous section. It is argued that although an ES application is considered as one of the fundamental business solutions for organisations, in realistic terms, the practice of ES implementation by organisations has revealed that potential ES benefits cannot be easily achieved. In other words, organisations find it difficult to perceive the change enabled by ES application.

It is of prime importance that research takes a well-balanced approach towards studying ES applications and organisational change in further detail.

Van de Ven & Poole (2005) cited from (Mohr 1982) argue that, in a broader level, organisational change approach can be explored under two main headings as “Variance Approach” and “Process Approach”. This distinction in organisational studies towards change derived from the philosophical notion of whether researchers consider organisations as things/noun (Organisations) or Verb i.e. (Process of Organising).

Variance approach towards organisational change can be considered as the relationship between pre-defined variables in organisations. Van de Ven & Poole (2005) argue that, this approach towards change might not reveal the nature of change in organisations in detail. As organisation and consequently the pre-defined variables are simply the reification of a set of processes that explain organisations and/or the variables.

Robey et al (2002) argue that, in studying organisational change enabled by ES, variance approach could be considered as ES Critical Success and Failure Factors (CSF) and ES effects. In variance approach on ES, researchers are
trying to speculate about the processes which produce successful outcomes. It could be perceived that variance approach, is tend to be quantitative and positivist in nature as researchers are inclined to describe the relationship with predefined variables and hypothesizing theoretical frameworks which lead to success and/or failure and commonly by statistical methods. For instance, whether top management support, has any relationship with other variables i.e. (training, financing, resistant to change etc.) and to what degree and whether this relationship leads to success of an ES project in the organisation.

Volkoff et al (2007) cited from Robey & Boudreau (1999) indicate that, greater value in terms of understanding organisational change enabled by ES could be derived from process approach rather than speculating about idiosyncratic outcomes under variance research. In process approach towards change, organisational routines first suggested by Nelson & Winter (1982) can be considered as a well-balanced unit of analysis to study organisational change and stability in organisations.

1.2. Area of Concern

This research will highlight how to study organisational change which is addressed by ES applications. Enterprise Systems (ES) as IS/IT application packages will be analysed further in terms of material aspect of technology and exploring a well-balanced approach in terms of theoretical ground and methodological underpinning towards technology enabled organisational change.

In this regard, organisational routines as a unit of analysis and vehicle of organisational change and stability will be considered. The dynamics of organisational routines considering ES application will be explored by aiming at incorporating ES application [Material aspect of Technology] as an external dimension of organisational change towards one of the main aspects of organisational change theory (D’Adderio 2011).

Relational approach towards affordances (Stoffregen 2003; Sayer 2010; Leonardi 2011) is one of the fundamental concepts that link organisational routines and ES applications (Robey et al 2012). It is important to understand
and analyse the relationship between ES application as a broader IS/IT technology and organisation features with reference to change and stability.

1.3. Research Gap

According to Faraj & Azad (2012), it has been growing interest and attention towards redefining and reinventing the theoretical linkage between technology (material aspect of IT) in a broader level with social organising. For instance (IT)-driven social change (Barrett et al 2006), IT-enabled changes in organisational form/function (Zammuto et al 2007), IT’s effect in organisation (Markus & Silver 2008), the role of materiality in organisational change (Leonardi & Barley 2008), and binding of social and material (Orlikowski & Scott, 2008), have been among most popular topics in the intermingle of IS/IT technology and social organising.

Faraj & Azad (2012) indicate that, these calls, share three distinctive characteristics as follows;

- The focus on material aspect of technology in order to highlight the “objective, realist and nonmentalist nature of technology”
- Majority of these researches indicate that current theoretical and methodological consideration such as structuration theory, practice approach, or emergent views in studying technology-organisational change; have not offered sufficient theoretical depth or empirical richness regarding the technology appropriation process.
- Finally, they identify technology affordances as a promising means of analysing and researching the technology appropriation process- especially as a way to rectify the shortcomings of the earlier approaches.

Recent publications in prominent IS/IT journals such as Journal of Association of Information System (JAIS), MIS Quarterly and JIT, indicate that, topic of ES enabled organisational change considering technology affordances in terms of empirical richness and applicability is still in its infancy and developing stage.

For instance, Strong et al (2014) study on “A Theory of Organisation-EHR Affordance” on JAIS and “Identifying generative mechanisms through affordances” by (Bygstad et al 2015) on JIT are the recent examples that
scholars are addressing theory development on technology enabled organisational change via “Technology Affordances” means.

1.4. Research Justification

This research is addressing the abovementioned research gap by the following justification for broader consideration in implementation of the research.

✓ This study explores the material aspect of technology in a broader sense and Enterprise System (ES) applications in particular to address the first point; to highlight the objective, realist and non-mentalist nature of technology. To this end, the focus of data collection is on professionals and experts who design the technology and artefact of Enterprise System (ES) applications and tailor and customise for organisations (See Chapter 5 for further details on the implementation of the research).

✓ This study is addressing the second gap by developing a conceptual theoretical framework which could potentially explain organisational change and stability enabled by ES applications in a well-balanced approach. The theoretical framework is driven by philosophical underpinning of Critical Realism (CR) which due to its stratified ontology is considered as Meta-Theory. Meta-Theory is considered as a wider theoretical lens which can capture area of concern in further depth in comparison with traditional theoretical and methodological paradigm (See Chapter 3 for further details).

✓ This study is addressing the last point by considering “Affordances” in theoretical and methodological considerations of the research. Relational approach (See chapter 3 &5) towards affordances is used which is considered as a postmodern and systemic approach towards exploring stability and change in organisations.

1.5. Research Aim and Objectives

This research lies in the context of organisational change theory and it is aimed at constructing a well-balanced theoretical and methodological underpinning to study “Technology Enabled Organisational Change” in a broader level and view this change with a holistic methodological lens. In particular, this research has the following objectives;
• Review the relevant literature on organisational change and organisational routine theory (Unit of Analysis for Studying Change)
• Exploring ES application features and affordances
• Exploring the relationship between ES affordances and organisational affordances
• Well-balanced theoretical and methodological considerations in ES enable organisational change and stability
• Shed light to deeper understanding of organisational change and stability with relational approach towards affordances

1.6. Research Questions

This study aims to answer the following research questions:

Main Research Question

- How do Enterprise System (ES) applications Enable and Constrain Organisational Change?

Sub-Research Questions

- What are the relationships between organisational routines elements considering ES applications?
- What are the consequences of organisational changes by ES applications?

1.7. Overview of the Research Methodology

Saunders et al (2016) indicate that, research design is the overall plan or systematic approach towards answering the research questions. Research could be considered as an interactive and dynamic process (Maxwell 2013) rather than linear and static. In other words, each component of the research i.e. Area of concern (A), Theoretical Framework (F) and Methodology (M) need to communicate with each component through the whole process of the research (Baskerville & Wood-Harper 1996).

The conceptual map of the research methodology adapted from the research onion framework of Saunders et al (2016) in chapter four (Figure 4.1.) shows
the details of methodological consideration for this research i.e. the dotted circle lines are the justified choices and methods.

The philosophical approach of Critical Realism (CR) in studying the process of organisational change in Information System (IS) research in particular has received considerable attention in top IS journals and various scholars explore this issue (Dobson 2001; Mingers 2004a, 2004b; Smith 2006, Volkoff et al. 2007, Strong & Volkoff 2010, Mutch 2010, Bygstad 2010, Wynne & Williams 2012, Volkoff & Strong 2013).

This research is studying the process of change considering the material aspect of technology which is developed by Enterprise System (ES) vendors and system designers. To this end, this study is exploring the concept of change through the lens of Critical Realism (CR) as the research broader philosophical underpinning. The conceptual theoretical framework which will be discussed in chapter three is methodologically driven. In other words, extended organisational routine theory has been mapped on stratified ontology of Critical Realism (CR).

In terms of research approach and mode of inquiry and reasoning, this research has adopted “Abduction” or in CR literature, “Retroduction” approach. Retroduction is the core principle of CR explanatory model and philosophically it is derived from the ontological assumption of emergence (in the stratified ontology) and epistemological focus on explanation. Causal mechanisms (generative mechanisms, tendencies) are the basis of the explanation. Relational approach towards affordances has been aligned and justified as generative mechanisms in terms of explanation of change and stability.

In terms of research method, this research is conducted under qualitative research method. “Enterprise System” is considered as a technology artefact where human or in sociological terms, social agents play an important role in implementation and process of change. Research in this field should consider both elements i.e. technology and human at the same time with a constitutive entanglement approach or as Orlikowski (2007) puts it; sociomaterial assemblage. In other words, technology of ES cannot be considered as discrete object/entity and out of context. Technology of ES does have meaning/interpretation both from systems designers, ES architects and
implementing organisations and it might be fundamentally different in various organisations. It is important to explore these meanings from various perspectives i.e. various system developers/designers (social agents) which sharply contradicts with a quantitative approach in which the focus is on quantitative and objective data and in extreme example, context is disregarded completely. In this sense, qualitative research method underpinned by critical realist philosophy would be justified to be the well-balanced methodological lens for this research.

Narrative inquiry as a solid research strategy has been considered and justified for this study. Czarniawska (1998) argues that, in order to explain the process theory of change, researchers need to shift the focus from description to explanation which requires a story and a plot. Czarniawska (1998) states that, narrative theory is the story in an abstract conceptual model which identifies the generative mechanisms. A narrative plot has been constructed based on the conceptual theoretical framework; first round of interview, the overall understanding of ES features, socio-technical system design, BPR, BPM and ES best practices etc.

Data collection has been conducted with semi-structure interview approach from various roles in ES vendors such as; system designers, enterprise architects and business developments. It is also important to note that narrative data analysis with reference to the conceptual theoretical framework has been considered for analysing data.

Figures 1.1; 1.2; 1.3 show the overall considerations of “Area of Concern”, “Theoretical Framework” and Methodological Consideration respectively. Figure 1.4, shows the interplay of theoretical framework (F), methodology (M) and the area of concern (A), which are considered as the main components of the research. The feedback loop shows the contribution for each dimension which will be drawn in conclusion chapter.
Research Gap:

Criticism Towards:

- Structuration theory (Giddens 1984)
- ANT (Latour 2005)

Most theories currently used in impacts research do not engage adequately with the material properties of IT artefacts (Leonardi and Barley, 2008; Orlikowski and Iacono, 2001).

Framing the change approach enabled by IT technology is more of a theoretical hence methodological problem (Volkoff 2007)

Research Justification

Growing interest & attention towards redefining and reinventing the theoretical linkage between technology and social organising (Faraj & Azad 2012)

- The focus on material aspect of technology in order to highlight the “objective, realist and nonmentalist nature of technology”
- Towards development of a holistic framework which can address technology enabled Organisational Change
- Using Affordances as a promising means of technology appropriation process

Research Aim

Constructing a well-balanced theoretical and methodological underpinning to study “Technology Enabled Organisational Change”

Research Question:

How do Enterprise System Applications Enable and Constrain organisational change?

Sub-Research Questions

- What are the relationships between organisational routines elements considering ES application?
- What are the consequences of organisational changes by ES applications?

Figure 1-1: Overview of the Area of Concern - A
Towards understanding Change & Stability Enabled by ES Artefact

Organisational Routine Theory
Organisational Routine as unit of analysis (Pentland and Feldman 2005)

- Ostensive (Structural Aspect of Routine-Abstract idea of routine)
- Performative (Agentic Dimension, actual performances of routine)

Interrelationship between organisational routines dimensions could explain stability & Change


Material Dimension: Putting material dimension (Technology) at the centre of the so-called ostensive and performative rather than peripheral

Epistemological Account: In CR field studies the focus is on identifying Generative Mechanisms (Aligning the concept of Affordances as subsets of Generative Mechanisms)

- Organisational Routine Dimensions Mapped on CR stratified Ontology
- Relational Approach Towards Affordances (ES – Organisation)
- Understanding Change & Stability through Retroduction & Generative Mechanisms

Figure 1-2: Overview of Theoretical Framework - F
Critical Realism Philosophy

**Stratified Ontology** (Nested Layer; Real – Actual – Empirical)

**Epistemology** (Exploring/identifying the Generative Mechanisms in play)

**Methodology**

**Narrative Inquiry**
- Story teller
- Narrative Plot (Has been designed after 10 interviews and secondary data; literature on organisational change theory, Affordances etc.) – First sketch
- Developed the Conceptual Theoretical Framework which could explain change and stability by ES applications
- Narrative as Representation
- Narrative Approach Philosophical Underpinning (Realist, Poststructuralists/Post Modernism)

**Qualitative Research Strategy**
- 9 professionals in the area of ES design and ES architecture in the duration of 26 months.
- Interviewees has been chosen mainly Enterprise System Vendors and ES consultants in the UK (SAP, IBM, Oracle, Microsoft)
- Purposive Sample: Certain roles associated with ES vendors have access to wider information in terms of ES design and ES features in terms of architecture which facilitates change processes in the organisations.
- Further 11 semi-structured interview in two round enrich the final plot & the findings

**Research Approach (Reitroduction)**
- Narrative Data Analysis (Conventional Approach)
- Combination of Affordances enable and constrain organisational change

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Figure 1-3: Overview of Methodological Consideration - M
Figure 1-4: Interactions between Research Components (F – M – A)
1.8. Overview of the Thesis Chapter

This research study provides a holistic overview and understanding towards change and stability enabled by Enterprise System (ES) applications in organisational routine elements using a qualitative narrative inquiry as a research strategy influenced by Critical Realism (CR) philosophy. The main source of data collection is semi-structured interviews from professionals with differing roles in major ES vendors in the UK in combination with secondary sources as documents and publications in terms of ES features and organisational routine elements.

The first chapter deals with the background study undertaken for this research. The significance of IS/IT applications and particularly ES applications will be critically discussed and the main area of concern for this research will be drawn. The research justification is addressing the research gap and set the foundation for the justification and significance of the research. Aims and objectives and research questions have been derived from the previous sections and an overview of the research methodology and the interplay of the F – M – A has been depicted in figure 1.4.

The second chapter is engaged with a critical review of various relevant literatures in ES and organisational change. Organisational routines as a unit of analysis will be explored and technology and materiality in broader level of IS/IT will be critically evaluated and explored in relation to influencing organisational routine elements. Sociomateriality and organisational change are the other important topics in this chapter which are explored in further. The literature gap, in terms of how to study ES and organisational change is identified and “Affordances” is considered as an important element in studying technology and ES organisational change from a well-balanced viewpoint. Adaptive Structuration Theory (AST) and Organisational Routine Theory (ORT) as two novel theoretical frameworks based on the recent studies on IT and organisational change will be explored in further in this chapter.

The third chapter of this study is engaged in developing a holistic theoretical framework which can explain change and stability enabled by an ES. Main dimensions of the theoretical framework are explored and justified in this chapter. The conceptual theoretical framework is methodologically and
Philosophically driven by CR stratified ontology which for some explanation of
the main terms and concepts of CR and methodological consideration, chapter
four can be read accompanied with chapter three.

The fourth chapter of this study deals with the methodological consideration to
conduct this research. CR main philosophical considerations in relation to
ontology, epistemology and methodology are explored and CR approach to
conduct this study is justified. A research onion framework and the selected
choices on Figure 4.1. is a good reference to view various components of
methodological considerations briefly. However, the justification for each
component is stated in the relevant section.

The fifth chapter of this study deals with the implementation of the research
with narrative inquiry as the single strategy. Various components of the
narrative with reference to organisational change and stability and with regard
to wider philosophical underpinning of narrative approach (Interpretative,
Realist and Poststructuralist) towards research are explored.

The sixth chapter deals with the findings and discussion on change and
stability. In the findings section, various relational affordances which explain
change and stability in organisations will be critically evaluated in further
details. Generative mechanisms with reference to innovation and change and
flexibility of ES platform and best practices and also integration and control
will be explored in further. In the discussion section of this chapter, the
conceptual theoretical framework is reviewed and critically evaluated towards
relational affordances and generative mechanisms under two main areas of
Stability/Control and Change/Innovation.

The seventh chapter depicts the summary of the main findings of the research
and the conclusions related to this research. It also addresses the three main
contributions to knowledge under three sections of theoretical, methodological
and practical contributions. Finally, the limitation of the study and further
research under the novel concept of relational affordances (ES – Organisations)
is stated. The overview of the research plan and relevant to each chapter is
depicted in Figure 1.5.
1.9. Summary

This chapter has provided a holistic overview of the research study in terms of the main research components. Research gap in a broader level in terms of technology and organisational change has been explored and this research was justified through addressing the gap. Research aim, objectives and questions have been articulated in further and summary of the methodological considerations were presented in this chapter. Brief overview of the data collection and data analysis method has been mentioned. In conclusion, this chapter has provided a brief synopsis of each of the preceding chapters to provide an overview to the readers.
Research Aims and Objectives – Problem Statement – Area of Concern (A)

Main Research Question:
How do ES Applications enable/constrain organisational change?

Sub RQ1:
What are the relationships between Organisational Routines elements considering ES application?

Sub - RQ2:
What are the consequences of organisational Changes by ES Applications?

Philosophical Underpinning of the Research
(Critical Realism Stratified Ontology)

Critical Review of the Literature
(ES Applications, Features, Organisational Change, Organisational Routine Elements)

Conceptual Theoretical Framework - (F)

(F) ES Enabled Organisational Change
 Epistemological Approach: Exploring/Understanding the Relational Affordances between ES & Organisational Routine Elements

Critical Review of the Literature

Popular CR Approach
Narrative Inquiry
• Story Teller
• Narrative Plot
• Interview themes
• Conceptual TF
• 2 Round of Interviews
• Narrative as Representations

Narrative Data Analysis
• Transcribing Data
• Making sense of data through narrative plot
• Retroduction (Logic of Analysis)
• Addressing the RQs.
• Relationship between RQs
• Reviewing the Conceptual Framework
Relational Approach Towards Affordances
  - Stability & Control (Governance, Discipline, Best Practice, Industry Solution)
  - Innovation and Change (Open Innovation, Open Source ES, Shared Platform)

Data Collection and Data Analysis
21 Semi-Structured Interviews from
• ES Designers
• ES Architects
• Business Analysts
• Business Developments
• ES Consultants
• Document Analysis (SAP ES Documents – Features of ES)

Data Analysis, Findings & Discussion
Narrative Data Analysis
• Transcribing Data
• Making sense of data through narrative plot
• Retroduction (Logic of Analysis)
• Addressing the RQs.
• Relationship between RQs
• Reviewing the Conceptual Framework
Relational Approach Towards Affordances
  - Stability & Control (Governance, Discipline, Best Practice, Industry Solution)
  - Innovation and Change (Open Innovation, Open Source ES, Shared Platform)

Chapter 1
Chapter 2
Chapter 3
Chapter 4
Chapter 5

Chapter 6 & 7

Conclusion

Contributions
• Theoretical: Developing TF that shed light to change and stability by ES
• Methodological: Narrative & Retroduction, Stratified Ontology
• Practical: Contributing to ES application design

Figure 1-5: Overview of the Research Process
2. **CHAPTER TWO- CRITICAL REVIEW OF THE LITERATURE**

2.0. Introduction

“A Literature Review is a written document that develop a case to establish a thesis. This case is based on a comprehensive understanding of the current knowledge of the topic. A literature review synthesises current knowledge pertaining to the research question. This synthesis is the foundation that through the use of logical argumentation allows the research to build convincing thesis case.”

*(Machi & McEvoy, 2016)*

The pace of IT-driven change and innovation and its increasing contribution to business transformation has been a major source of attention and spending in many industries as according to Gartner (2016). Gartner report highlights that the total worldwide IT expenditure has been estimated at $3.5 Trillion in 2016 which is around 5 percent of the worldwide GDP. While current business landscape has been driven by many challenges and opportunities, organisations are constantly looking for ways they can exploit (IS/IT) Technology for efficient and effective business delivery, maintain growth and create business value. Information Technology in general and Enterprise Systems (ES) application in particular improve organisational dynamic capabilities and change the way organisations do business by transforming organisational structures and routines.

A detailed literature review has been conducted on the main components of the thesis topic which addresses the research questions in particular. This literature review falls into eight sections and sets the foundation for developing the theoretical framework of the thesis which will be presented in chapter three.

The first part of the literature review will explore the “Enterprise System” applications; definitions, varieties and forms and its evolution through time.
The reasons and the importance of adopting ES in current competitive environment will be explored as subheadings of this section.

The second section of the literature review will explore the variety of researches that can be done in ES in a broader level. This section will explore the prior research in ES system implementation, in terms of adoption, critical success factors (CSR), process research etc. and justify the choice and focus of this research in terms of the methodology which will be explored in detail in methodology chapter.

The third section of the literature review corresponds to the main focus of the research topic which is “Organisational Change” in general. In the subheading of this section, “Organisational Routines” as the unit of analysis of change in organisations will be explored further in correspondence to the research questions.

The fourth section of the literature review, will explore the materiality in organisational studies and the background and the evolution of research considering materiality and technology in organisation and management discipline. Sociomateriality which is a hot topic in the current IS/IT and organisational literature and Socio-Technical Systems will be explored more deeply within the subheadings of this section.

The fifth part of the literature review will explore various theoretical considerations in IT and social organising. Technology and IT affordances as the main focus of the recent theories in IT enabled change will be explored in the subheading of this part.

The sixth section of the literature review will critically explore two recent theoretical frameworks in IT enabled organisational change. Adaptive Structuration Theory (AST) and Organisational Routine Theory will be explored in the subheadings of this section.

The seventh section of the literature review will explore organisational routines with reference to ES. Finally, a brief summary will be covered, in order to set the foundation for the theoretical framework section in chapter three.
2.1. Enterprise Systems

According to Markus & Tannis (2000), Enterprise Systems (ES) are referred to commercial software packages that enable the integration of transaction-oriented data and business processes throughout the entire organisation. According to a novel definition towards ES Enterprise Systems; Seddon et al (2010) state that “Enterprise Systems” are large-scale, integrated and real-time application/software packages which adopt computational, data storage, and data transmission power of modern information technology to support processes, information flows, reporting, and business analytics within and between complex organisations.

Enterprise system applications have been developed from material requirement planning (MRP) which supported the working procedures mainly in manufacturing sector. Enterprise Systems has evolved towards more holistic, sophisticated IT/Business solutions nowadays such as ERP, CRM and Cloud based ERP in order to support complicated business issues and to manage and control organisational resources more efficiently and effectively (Rayner 2014). The scope of ERP systems has been started from integration of the business processes in the company and has been expanding to inter-enterprise integration with a focus on supply chain management (Gunasekaran et al 2009).

Enterprise systems have been developed as a promising tool and a holistic business solution which potentially would integrate and extend business processes across the boundaries of business functions at both intra-organisational and inter-organisational levels (Xu, 2011).

This emergence of ES applications has been aligned with the development in the global economy and the advancement in the information technology and information systems. ES with the development of IT industry could potentially enable various businesses from manufacturing towards the service sector with a viable business solution to survive in the competitive market.

ES provides a single system as a central database in the organisation and ensures that information can be shared across all functional areas. According to Xu (2011), ES provides an IT platform that enables industrial organisations to
integrate and coordinate their business processes and it is regarded as a revolutionary development in the continuous evolution of computer applications in businesses across a variety of industries.

Xu (2011) states that a common goal of any ES application is to facilitate business processes and integration and this is considered as a common purpose for any organisation. For instance, SAP R/3 is used in various organisations and industries and it is designed for a wide range of enterprises rather than a unique organisation.

It is important to identify the key characteristics of an Enterprise System (ES) due to its widespread dominance and impact that ES has on almost all major businesses and industries in the world. For instance, SAP the biggest Enterprise System vendor in terms of revenue and dominance in the IT market, supports more than 25 industries and nearly 50,000 customers worldwide (SAP.com). Marcus & Tannis (2000) and Xu (2011) pointed to some overall feature of an ES as;

- **Integration** of Data & Application; (Davenport, 1998).
- **Packages**; they could be purchased or in current market by leasing and subscription business model from software vendors such as SAP, Oracle, Microsoft etc. rather than being developed in-house from scratch (Markus & Tannis (2000)
- **Best practices**; AS ES are designed to fit the needs of many organisations in various industries, they are usually built to support generic business processes that may differ quite substantially from the way any particular organisation does business (Xu, 2011)
- **Standardized solutions** of business problems
- **Customizations**; Empirically, enterprise system–adopting companies have had great difficulty integrating their enterprise software with a package of hardware, operating systems, database management systems software, and telecommunications suited to their particular organisational size, structure, and geographic distribution.
- **Evolving**. Finally, like all of IT, enterprise systems are rapidly changing, ES applications are changing *architecturally* (Giachetti 2010). In the 1980s enterprise systems were designed for the mainframe system...
architecture. They have also been designed for client-server architectures and later vendors released Web-enabled versions of the software; and cloud platform most vendors have object-oriented versions and recently SOA (Service Oriented Architecture). The functionality of enterprise systems is also evolving. ES vendors are releasing extensions to their core products designed to handle “front office” (i.e., sales management), “supply chain” (i.e., advanced planning and scheduling), data warehousing, specialized vertical industry solutions, and other functions.

According to Seddon et al (2010), several terms are used in academic and research domain, enterprise system and ERP (Enterprise Resource Planning) being the most commonly used. These terms are referred to all large organisation-wide packaged applications including enterprise resource planning (ERP), customer relationship management (CRM), supply chain management (SCM), data warehousing, and any application components of the software platforms on which these applications are built (e.g., SAP’s NetWeaver and Oracle’s Fusion). They also indicate new ES application with the enablement of cloud and mobile computing.

Elragal & Kommos (2012) argue that such technologies provide greater innovation potential, as well as further computing capability to Small and Medium Sized organisations (SMEs). Columbus (2014) refers to a survey by the Gartner group which demonstrates that, 47% of organisations are planning to move to cloud-based platforms within the next 5 years and the majority of those are considered as small and medium organisations.

According to Elragal & Kommos (2012), there are different types of enterprise software packages as follows;

- Enterprise Resource Planning Software (ERP Application),
- Customer Relationship Management Software (CRM Application),
- Business Intelligence Software (BI)
- Supply Chain Management Software (SCM Application),
- Business Process Modelling Software (BPM),
- Enterprise Content Management (ECM),
- Knowledge Management Software (KMS)
- Workflow management software etc.
2.1.1. Reasons for Adopting Enterprise Systems

When considering the richness of enterprise system applications in terms of their functionality as a decision-making tool, the potential benefits within any organisation and its widespread implication in industry level in terms of competitive advantage, it is not surprising that organisations are adopting these applications for many different reasons (Robey et al 2002, Ross & Vitale 2000).

For instance, Marcus & Tannis (2000) pointed to some problems arose in the beginning of the 21st century as solving the Y2K problems, technical reasons such as reducing mainframe system operating costs, the need for increased systems capacity to handle growth, or the need to solve the maintenance difficulties associated with the aging legacy systems.

There are variety of motivations to adopt enterprise systems when attempting to assess or explain their impacts and or disadvantages and negative consequences. It is important to point out the significance of ES in various levels.

2.1.2. Importance of Enterprise Systems

Financial Costs and Risks. Installing an enterprise system is an expensive and risky venture. Large companies have been spending on the order of hundreds of millions of dollars to make the technical and business changes associated with enterprise systems. There have been several visible enterprise systems failures, and non-academic studies have questioned the financial and business payoffs from enterprise system projects. Therefore, enterprise systems raise questions that have long been studied in the IS field under the following labels: the payoff from investment in information technology, IS project success and failure, and IS implementation process and change management (training, user involvement, communication, etc.) (Markus & Tannis 2000)

Technical Issues. Enterprise systems are technically challenging. Among the more important technical areas of research around enterprise systems are the “development” life cycle for enterprise system packages; software selection approaches; enterprise modelling and software configuration tools and techniques; “reference models” for particular industry segments, systems integration strategies, and systems and software architectures; and data
quality, reporting, and decision support for enterprise systems (Markus & Tannis 2000)

**Managerial Issues.** Enterprise system projects are managerially challenging since they may involve parties from many different organisations and cut across the political structures of the organisation. Moreover, enterprise systems have important implications for how companies should organise and manage their information systems functions.

**IT Adoption, Use, and Impacts.** Enterprise systems have been widely adopted across organisations, and the adoption of these technologies may spread further. However, it is not yet known how widely these technologies have been assimilated (Fichman & Kemerer, 1997) in organisations. For example, how extensively they are used within the organisation, how faithfully they are used, and how effectively they are used. These systems have large potential impacts at all levels of analysis: individual and societal (employment, occupational structure, skills required, and quality of work), work system (cooperation, business process efficiency), organisational (competitive advantage, business results), and inter-organisational (impact on supply chain, industry structure). In addition to the general topics of IT adoption, use, and impacts, enterprise systems are linked to research on business process reengineering (Davenport 1998), inter-organisational information systems and the strategic use of information technology (Markus & Tanis 2000).

This research is about “Enterprise Systems” in general in terms of technological changes in organisations. However, it is useful to highlight a specific definition for various terms which will be used during this research. Three main concepts in terms of technological labels (concepts) in contemporary organisations are ERP, Cloud Computing and SOA (Service Oriented Architecture).

**ERP Applications**

Enterprise resource planning (ERP) is an industry term for the broad set of activities that helps an organisation to manage its business (Davenport 1998). An important goal of ERP is to facilitate the flow of information so business decisions can be data-driven. ERP software suites are built to collect and organise data from various levels of an organisation to provide management with insight into key performance indicators (KPIs) in real time. According to
Davenport (1998), ERP software modules can help an organisation’s administrators monitor and manage supply chain, procurement, inventory, finance, product lifecycle, projects, human resources and other mission-critical components of a business through a series of interconnected executive dashboards.

According to Benlian et al (2009) Legacy ERP systems tend to be architected as large, complex homogeneous systems which do not lend themselves easily to a software-as-a-service (SaaS ERP) delivery model. As more companies begin to store data in the cloud, however, ERP vendors are responding with cloud-based services to perform some functions of ERP particularly those relied upon by mobile users. An ERP implementation that uses both on-premises ERP software and cloud ERP services is called two-tiered ERP (Sap.com)

**Cloud Computing**

According to Hill et al (2013), “cloud computing is a means by which computational power, storage, collaboration infrastructure, business processes and applications can be delivered as a utility, that is, a service or collection of services that meet your demands”.

Hill et al (2013) argues that the services which offered by the cloud means are similar to a utility i.e. Organisations pay for what they use. If an organisation wants extra processing power, it is available on demand and when an organisation needs stops for extra processing power it reverts back to the nominal usage and the company is only billed for the extra boost. With this business model, organisations do not need to invest in a lot of hardware to cater for the peak usage, accepting that for most of the time it will be underutilised. This feature of cloud based business model is called “elasticity” which helps a lot of company to manage their resources and money more effectively.

**SOA (Service Oriented Architecture)**

Hill et al (2013) state that the term service orientation refers to the clear demarcation of a function that operates to satisfy a specific need. Utility companies offer their services in the form of energy supply, billing and perhaps, as energy conservation becomes more widespread, services that support a customer’s attempt to reduce their energy consumption.
The services that are offered to the consumers are likely to be aggregations of much finer-grained services that operate internally to the business. It is this concept of abstraction, combined with object-oriented principles such as encapsulation and cohesion that helps define services within an organisation. Service-oriented architecture (SOA) utilises the principle of service orientation to organise the overall technology architecture of an enterprise Hill et al (2013).

2.2. Research on Enterprise Systems

According to Czarniawska (2008), technology in general and Enterprise System in particular, “makes organising durable”. Robey et al (2002) state that the significant growth in enterprise system applications may be explained by their proclaimed benefits.

Enterprise Resource Planning (ERP) application is considered as the main IT investment which companies have been making during the past decade and surely it has cost them large amount of resources. Large organisations started implementing Enterprise System (ES) and the focus is now being shifted towards small and medium size enterprises (SMEs) (Rao & Mandal 2011).

There can be considered various change approaches on ES in organisations. i.e. Variance approach and Process approach with different ontological and epistemological underpinnings which has been briefly discussed in the research background section.

2.2.1. Prior Research on Enterprise System Applications

There have been various researches in different context on ES implementation to date which can be categorised under two main headings i.e. Variance Research and Process Research. This distinction between researches in Enterprise system is cited from Robey et al (2002).

Variance Research on Enterprise System

A considerable amount of academic research has been done considering variance research under two particular streams which can be distinguished to ERP critical success factors and studies of ERP effects (Robey et al 2002).
Critical Success Factor in ERP implementation

According to Abdel-Kader & Nguyen (2011), there have been mixed results in ERP implementation by organisations, in terms of successful implementation along with significant failures by many enterprises and also partial success and failure. Furthermore, some research revealed that most of the problems (technical or organisational) that companies encountered have occurred during the process of implementation from initial stages to the last phase.

According to Finney (2011), there has been an extensive amount of research on critical success failure factors of ERP implementation and this topic is regarded as one of the popular issues in information system literatures in the past decade. The main cause for the popularity of research in CSF of ERP implementation is the belief that the degree of understanding of various success factors will increase the chance of smooth and successful implementation.

The range of CSFs of ERP implementations is enormous and varying from project management and team composition to strategy and vision of the organisations. Although there has been a lot of research on the diversity of CSFs of enterprise implementation in IS literatures, there are few which could provide greater understanding of how specifically the CSFs need to be managed.

Studies of Enterprise System Effects

According to Robey et al (2002), research on ERP effects has shown that some ES effects are immediate whereas others are delayed, and some effects are positive whereas others are negative. For instance, some firms begin to see improvement in inventory levels and deliveries soon after implementation, but others do not see such improvements for more than one year following implementation. Firms have discovered that poor data quality hindered potential process improvements and that users were unhappy with some system features.

Enterprise systems were also regarded as applications with less flexibility than traditional/manual information system i.e. legacy systems as the processes in the organisation are driven by the technology and human actors do not have authority over changing the processes (Robey et al 2002).
Like the literature on ERP's critical success factors, studies of ERP effects, offer little in the way of theoretical explanations for reported findings.

**Process Research on Enterprise System**

According to Robey et al (2002), “Variance research” on ERP application largely tends to speculate about the processes connecting antecedents with outcomes; whereas process research seeks to explain how change emerges, develops, and diminishes over time.

Van de Ven & Poole (1995) argue that, there could be considered four mechanisms or motors that would potentially drive organisational change and those are: Life cycle, Dialectic, Teleological and Evolutionary.

Enterprise System allows an organisation to implement fully integrated systems to replace its legacy systems, which are extremely difficult to maintain because of their age, size, mission-critical status, and frequent lack of documentation. Robey et al (2002) argue that implementation of ES packages are often associated with more fundamental organisational improvement efforts, such as “Business Process Reengineering” (BPR). Indeed, the primary benefits of an ERP installation may result from new business processes, organisational structures, human resource skill requirements, and knowledge management.

**2.3. Organisational Change**

Organisational change is one of the important and central topics in organisational management literature and there exist numerous and conflicting approaches on studying change in organisation. Van de Ven & Poole (2005), categorised change in organisations with regard to its philosophical dimensions i.e. Ontology (how to perceive the reality of organisations) and Epistemology (how to study the change in organisations) to four categories (Table 1.).

It is crucial to understand the philosophical position of the researcher to study organisational change, as the philosophical underpinning of the research would make implicit and/or explicit assumptions about the various components of the research; mainly; methodologies and adopted theories (Mingers 2001, Chen & Hirschheim, 2004).
Table 2-1: Typology of Approaches for Studying Organisational Change

<table>
<thead>
<tr>
<th>Epistemology (Method for studying change)</th>
<th>Ontology</th>
<th>Epistemology</th>
<th>Approach I</th>
<th>Approach IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>An organisation is represented as being:</td>
<td>A noun, a social actor, a real entity (‘thing’)</td>
<td>A verb, a process of organizing, emergent flux “The act of Organising”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Organisation”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Variance method</td>
<td>Variance studies of change in organisational entities by causal analysis of independent variables that explain change in entity (dependent variable)?</td>
<td>Variance studies of organizing by dynamic modelling of agent-based models or chaotic complex adaptive system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Process narratives</td>
<td>Process studies of change in organisational entities narrating sequence of events, stages or cycles of change in the development of an entity</td>
<td>Process studies of organizing by narrating emergent actions and activities by which collective endeavours unfold</td>
<td></td>
</tr>
</tbody>
</table>

Source: Van de Ven & Poole (2005)

An important issue which influence the perception of change in an ontological sense is whether the researcher perceives the organisation as a “Thing” or as a “Process” (Tsoukas & Chia 2002).

Rescher (1996) as cited in Van de Ven & Poole (2005) argues that the ontological view about organisations as things or processes goes back to ancient and differing philosophies of Democritus and Heraclitus. Democritus perceived nature as stable material and things which only change in their positioning in space and time whereas Heraclitus perceived reality not as the constellation of things but also a web of processes.

Heraclitus argued that substantializing nature into fixed entities is a mistake as they are emerged by various fluctuating activities and processes. “Process is fundamental: The river is not an object but an ever-changing flow; the sun is not a thing, but a flaming fire. Everything in nature is a matter of process, of activity, of change” (Rescher 1996: 10).
Exploring various literature on 19th and 20th centuries shows that the majority of studies adopted Democritus view about reality on change, however there have been notable exception which influence the organisational change paradigm extensively such as C. S. Peirce (1839–1914), William James (1842–1910), Henri Bergson (1859–1941), John Dewey (1859–1952), and Alfred North Whitehead (1861–1947). According to Rescher (1996), as cited in Van de Ven & Poole (2005), the processual philosopher mentioned earlier, viewed reality as a process and regarded time, change, and creativity as representing the most fundamental facts for understanding the world.

The demarcation in viewing reality as things or processes has influenced organisational studies since its conception. For instance, Whetten (2005) views of organisations, as things or social actors and emphasises that the researcher should have strong view about organisation as a “Substance”. Whereas Tsoukas (2005), Langley et al (2013) and majority of process organisational theorists make a distinction between organisations as things or as a noun from the act of organising i.e. a verb or a process.

In terms of various methods for studying change in organisations Van de Ven & Poole (2005) categorised the epistemologies (methods for studying change) to Variance Approach and Process Approach.

Variance approach describes continuous change in organisations by deterministic causation with independent variables and usually statistical and quantitative methods would be used to identify the relationship between variables. Whereas in process approach which is associated with process theory explanation of the temporal order and sequence, in which change events occur based on a story or historical narratives (Pentland 1999; Poole et al. 2000; Tsoukas 2005, Langley et al. 2013).

This demarcation in studying change is important i.e. (variance or process approach) as it justifies the rigour and relevance of the research in studying change.

For instance, a typical study of Critical Success Factors (CSF) in ERP implementation based on variance approach; explores the relationship and causation between the predefined variables. To name a few of these predefined
variables; change management, top management support, user involvement and resistance, training, funding, vendor involvement, consultancy, cost of ERP application etc. and seeking to prioritise between the variables and/or high dependencies and relationships. Whereas process studies of change in an ERP implementation explores narratives, the focus is on key decisions, events and various strategies taken by the company.

According to Barnett & Carroll (1995), as cited in Van de Ven & Poole (2005), studying ‘content’ and ‘process’ of change in organisations refers to variable and process approach respectively. They argue that “Content refers to what actually changes in an organisational entity, while “Process” examines how the change occurs.

Reviewing the literature on the relationship between Enterprise Systems (ES) and organisational change shows that, information technology (IT) plays an important role in the change process. It has been becoming popular among organisation and management theorists to use the concept of materiality in the studies of technology and social organising and change process (e.g., Suchman, 2000 Dale, 2005; Orlikowski, 2007; Leonardi and Barley, 2008; Osterlund, 2008).

As this research seeks to understand the nature of change in terms of its processes influenced by “Enterprise Systems” in organisational settings, the next part of the literature review explores the role of materiality in a broader sense in organisations and critically explores how to study and perceive change considering Enterprise System (ES) applications.

2.3.1. Organisational Routines as a Unit of Analysis

Nelson & Winter (1982) first recommended organisational routines as a unit of analysis for examining organisational change and stability. Research on organisational routines in terms of the components and definition has been accumulated ever since; see Becker (2008) for a comprehensive review on organisational routines.

In terms of introducing the “Organisational Routine” concept in this part of literature review various definition and studies will be explored in further.
According to Feldman & Pentland (2003), organisational routines are a central feature of any organisation and it would be used as an explanatory mechanism in many of our most widely accepted theories. The concept of routines in organisational studies was first introduced by Stene (1940), who stated that organisational routines are considered as the primary means by which organisations accomplish much of what they do.

Feldman & Pentland (2003) argue that organisational routines as a vehicle, which facilitate organisational goals and objectives, has deep roots in social theory, and it was reflected in literature on bureaucracy (Merton, 1940; Weber, 1947; Selznick, 1949; Gouldner, 1954; Blau, 1955). Organisational rules and routines have been seen as an important source of accountability and political protection as well as a source of stagnation (Weber, 1947; Crozier, 1964; Kaufman, 1977; Hummel, 1987).

Feldman & Pentland (2003) argue that while routines enable bureaucracies and empower managers to exercise power, control and govern more efficiently and reduce flexibility they can also be an important source of flexibility and change.

Many organisations employ meta-routines, such as continuous improvement and (TQM) total quality management (Hackman and Wageman, 1995), as a means to generate change. Meta-routines have been theorized as mechanisms for generating "dynamic capabilities" (Teece & Pisano, 1994; Tranfield & Smith, 1998).

Pentland & Feldman (2005) define organisational routines as “repetitive, recognizable patterns of interdependent actions, carried out by multiple actors”.

Pentland & Feldman (2003) argue that ontologically the idea of routines, like other social phenomena; embody a duality of structure and agency (Giddens, 1984; Bourdieu, 1977, 1990). In this regard an organisational routine has two interrelated components as “Ostensive” and “Performative”. The ostensive aspect of the routine embodies the abstract idea of the routine (structure) or as they define it “abstract, generalized idea of the routine, or the routine in principle”.
Whereas performative aspects of the routine or agentic dimension, consists of the actual performance of the routine by specific people, at specific times, in specific places i.e. routine in practice (agency). Pentland & Feldman (2003) argue that both Ostensive and Performative dimensions of routines are required to describe the properties of organisational routines and also understanding the interactions between these two aspects is necessary to appreciate the potential of organisational routines as a source of change and stability in organisations.

According to Volkoff et al (2007), in examining changes in organisational routines, in addition to ostensive and performative aspects, routines also have a material aspect that is embedded in the technology. This is in contrast to Pentland & Feldman (2005) who included IT in the broad set of physical artefacts associated with routines in their argument.

2.4. Materiality in Organisational Change

Kallinikos et al (2012) state that, new technologies change the way people act, organise and communicate their social relations. For instance, with the advancement in IT, technologies such as computers, smartphones, GPS and tablet devices etc. change the traditional way of communication and the way people organise their social needs and activities.

Although academic scholars do not deny the importance of IT and new technologies in modern life and recognise the fact that new technologies reconfigure social practices, however few are ready to affirm a direct and linear causal relationship between technologies and social organising. In other words, academics in various fields such as “Anthropology”, “Sociology”, “Information System”, “Technology Studies” etc. do not readily accept technology as “shape”, “Create”, “Determine” social changes. Instead they incline to argue that new technologies “Enable,” “Occasion”, “Afford” “Enact” “Make Possible” “Co-Construct” or “Mutually Constitute” the social context into which they are introduced (Kallinikos et al 2012).

According to Leonardi (2013), one reason that academics ignore the material aspect of technology, is because decades of research aimed at countering technologically deterministic claims are influenced by early contingency
theorists (e.g., Hickson et al., 1969; Hunt, 1970). The contingency theory considers technologies like computers, software programs, and even desks and chairs as artefacts that are embedded in a web of social practice. In other words, if people do not develop or use technology, the technological artefacts with which those people work daily would have no meaning nor could they bring particular affects to the organisation of work.

Research from 1980 onwards in technology and social studies, shows the focus on concrete social science disciplines such as sociology and scholars working with more fine-grained levels of analysis began to challenge the assumptions made in previous research with the focus on the deterministic role of technology. For instance, the “social constructivist” approach which gained popularity in academic circles around 1980s, argued that any effects that new technologies had on the way people worked were mediated by a variety of social processes rather than causation from technology. Consequently, the occurred social change in the wake of a new technology’s implementation were described by academics who support social constructivist approach as likely to be the result of people’s choices about how to design and use of the technology as attributable to the artefact itself (Kallinikos et al 2012).

Grint & Woolgar (1997) argue that extreme social constructivist approach ignores technologies and as they put it “technologies hardly matter at all in discussion of social change”. Their focus is instead on the ways in which those technologies are used in the context of work or other social settings.

The forms of empirical research that have emerged from “social constructivist” approaches do not link a particular social change to specific technology features, and also, they do not describe in any detail what features a technology has or how they are used. Instead studies taking this rather extreme ontological position, document ways in which a new technology becomes embedded in a “Web of Interpretation”, a “Practice”, or a “Cultural Meaning System” and how perception “Enact Social Practices” or “Enable Interactive Shifts”. In short, technologies, themselves cease to be important in studies of social change. At best, they become an occasion for studying social relationships in particular contexts of social or institutional life (Kallinikos et al 2012).
This over-socialized view of technology has been tempered, in recent years, by a new stream of research arguing for a “sociomaterial approach” to the study of organising (Leonardi 2013).

In research in technology and social organising, it can be seen two extreme poles as technological determinism and radical constructivism. Sociomaterility a new concept first coined by Orlikowski (2007), stating that “Every organisational practice is bound with [a technology’s] materiality and arguing that materiality matters for theories of technology and organising because the material properties of artefacts are precisely those tangible resources that provide people with the ability to do old things in new ways and to do things they could not do before (Leonardi & Barley 2008).

This was an attempt to highlight the important role that technologies play in organisational life and organisational researchers have followed the broader “material turn” in the social science (for a review see Swedberg, 2008) by arguing for a focus on the ways that technology’s materiality becomes implicated in the process of organising and social practice in general.

Kallinikos et al (2012) argue that, although shifting the focus towards material in terms of incorporating the role of materiality into the constructivist understanding of the social world sounds like a well-balanced strategy, various jargon and academic concept has emerged and is used inconsistently, such as; “material”, “material consequence”, “sociomaterial”, “sociomaterility” and “material property” without a concrete definition. Furthermore, the relationship to concepts in regular use in the social sciences such as artefact, technology, socio-technical systems, and affordance is not yet clear.

2.4.1. Sociomaterility in Organisational Studies

The term “sociomaterility” is, obviously, the fusion of two words: social and materiality. The term has been used without hyphen by Orlikowski (2007) and the explicit definition of the concept is twofold

(a) All materiality (technology - hardware and software, objects etc.) are social in that is created through social processes and it is interpreted and used in social contexts.
(b) All social actions are possible because of some materiality.

2.4.2. Socio-Technical Systems in Organisational Studies

The term “socio-technical system” appears distinct from the term “materiality” in that materiality simply refers to the properties of a technology that are used in various ways to support various tasks in the technical subsystem. The notion of a technical subsystem in socio-technical systems theory does not seem very different from the term “sociomaterial practice” because both refer to a space in which work is made possible through the imbrication of social and material agencies. But a “socio-technical system” appears to be distinct from a “sociomaterial practice” in that it refers to the entire organisation of work (abstract institutional constructs and patterns of sociomaterial imbrication), as opposed to a group’s localized experiences around a particular or various technologies. Thus, an organisation might be conceptualized as a “socio-technical system” but not a “sociomaterial practice” (Leonardi 2012).

Sociomaterial practices (or “technical subsystems,”) influence and are influenced by broader abstract social structures such as roles, statuses, hierarchies, power relations, communication networks, and other similar constructs. Kallinikos (2011) calls such abstract social structures “institutional forces.” He suggests that institutions are temporally bound and, consequently, should not be simply seen as a way for researchers to vacillate between micro and macro levels of analysis, but that they are useful for moving from static to dynamic patterns of analysis such that each layer of sociomaterial imbrication becomes more substantial in that it shapes action in a path-dependent manner because of its history of accumulation.

Figure 2.1 provides an illustration of how these various terms might relate to one another. The shaded boxes at the right side of the figure indicate that people have intentionality and technological artefacts have materiality. As people approach technological artefacts, they form particular goals (human agency) and they use certain features of the artefact’s materiality to accomplish them (material agency). These collective human (social) and material agencies become imbricated in the space of practice.
Certain imbrications produce changes in the abstract “social” formulations (e.g., roles, status, etc.) that occupy so much of organisation theorists’ attention. Alterations in these abstract formulations can shape future patterns of imbrication, which, in turn, can bring changes to an artefact’s materiality or a person(s)’ intentionality. This mutual shaping of social and technical subsystems (indicated by shaded ovals) is what defines a socio-technical system. We might usefully be reminded that organisations are socio-technical systems.

To be sure, the road to nuanced and empirically grounded understanding of the relationship between technological and organisational change is littered with academic jargon. Some of that jargon—terms like “strategic choice,” “joint optimization,” or “equifinality”—is rarely used today while other jargon—terms like “structuration,” “inscription,” and “morphogenesis”—is still widely in use.

Figure 2-1: Relationships between materiality, sociomateriality and socio-technical systems

*Source: Leonardi et al (2012)*
2.5. Sociomateriality and Organisational Change

As it was argued above, majority of theories on organisational change either ignores technology as in pure social constructivist approach or treated technology as isolated and detached from social organising and consider technology as deterministic with linear effects on organisations (Avgerou 2000, Gosain 2004, Volkoff et al 2007).

However, by treating technology as a substance or material within organisations and or social by the concept of sociomateriality, organisational change theories have been transformed more holistically.

According to Leonardi (2013), the objective of viewing organisation change considering sociomateriality is to bring the substance of technological artefacts back into theories of organising.

The sociomaterial approach, argues that work occurring within organisations is not a social practice enabled or constrained by technology (Orlikowski, 2010), that technological artefacts are not simply collections of materials organised by social processes (Pinch, 2010), but rather that organisations and technologies are simultaneously social and material. That is, they are both “sociomaterial.”

As Leonardi (2009: 300), suggests:

“If technology is a sociomaterial process and organizing is a sociomaterial process, too, there exists no important distinction between technological and organisational change. That is, the appropriate unit of analysis for “technology” is the artefact and the people interacting with it and around it, and the appropriate unit of analysis for “organizing” is people interacting with each other and the artefacts that enable or constrain their interaction”.

Although technological artefacts like a social media tool or an Enterprise Resource Planning (ERP) tool or a computer-simulation tool are sociomaterial in nature. It still has a certain materiality that transcends space, time, and context (Leonardi 2013). For although someone arranged the digital materials out of which such tools are fashioned during development, those arrangements endure after the technology leaves the developer’s desk.
Similarly, when everyone leaves the office at the end of the day some part of those tools still sit on someone’s hard drive on a computer on a desk. It is precisely because technological artefacts have a materiality that exists apart from people that they are useful for work. This is because the materiality of a certain type of simulation technology is the same, whether an engineer uses it at the firm’s offices in Detroit or Bangalore means that offshoring of work at the task-level can occur (Leonardi and Bailey, 2008).

In fact, if a technological artefact did not have a fixed materiality, extreme constructivist theorizing would not be possible. The prototypical constructivist study shows that people in two different organisations use the same new technology differently and, consequently, change (or do not change) their informal organising in distinct ways (e.g., Zack and McKenney, 1995; Robey and Sahay, 1996; Orlikowski, 2000). The only way that scholars have been able to demonstrate these findings empirically is because the materiality of that technology was the same in both organisations under study.

### 2.6. Literature Gap

Volkoff et al (2007) argue that, framing the change approach considering the introduction of IT artefact such as an ES into an organisation has not been consistent and rigour due to adopted theories and hence methodologies. In terms of theoretical consideration, it is argued that the majority of research in this field takes a deterministic approach for instance “institutional theories” (Avgerou 2000, Gosain 2004), to explain change in organisational forms, functions and processes, however contradictory results highlighted the weakness of such approaches. Langley et al (2013) argue that greater value in explaining change needs to be explored by studying the process of change rather than the idiosyncratic outcomes.

Furthermore, adopting various social constructivist approaches towards technology enabled organisational change, such as structuration theory (Giddens 1984) or Actor-Network-Theory (ANT) (Latour 1996, Walsham 1997), present conflicting view and it is problematic in practice and reality (Volkoff et al 2007).
Volkoff et al (2007) indicate that, social constructivist approaches such as structuration theory and even ANT towards IT enabled organisational change tend to put the emphasis on the action of agents (human side and organisations) and incline to ignore the technology and IT side, while those using institutional theory tend to ignore agency. Furthermore, IT technology is often considered as a concrete object, ignoring each technology’s distinctive characteristics.

In this regard framing the change approach enabled by IT technology is more theoretical hence methodological problem. It is argued that a well-balanced theory on IS/IT software packages in organisational forms and function should address the specific role of technology, while also incorporating the effects of agency/human. Orlikowski & Scott (2008) argue that, developing new ways and consequently theories of dealing with materiality in organisational research is critical if we are to understand the contemporary forms of organising that are increasingly constituted by multiple, emergent, shifting, and interdependent technologies.

In the next section, various theoretical considerations in IT and social organising will be explored in further detail. The concept of “Affordances” which is one of the main dimensions of the conceptual theoretical framework (that will be presented in chapter three) will also be critically explored.

2.7. Theoretical Consideration in IT and Social Organising

There has been increasing attention in academic circles after 2007 when Orlikowski introduced the concept of sociomateriality in redefining and reinventing the theoretical linkage between social organising and technology (Faraj & Azad 2012).

The studies show the attempt to redress the organisational change approach by combining materiality in technological sense with social in order to better capture the reality of organisational change. For instance, (IT)-driven social change (Barrett eta al 2006), IT-enabled changes in organisational form/function (Zammuto et al 2007), IT’s effect in organisation (Markus & Silver 2008), the role of materiality in organisational change (Leonardi &
Barley 2008) and the binding of social and material (Orlikowski & Scott, 2008), can be considered as researches by scholars in the past decade to address the theoretical and methodological issues in IT and social organising.

Farj & Azad (2012) argue that these studies, share three unique characteristics as follows;

- First, they focus on the materiality aspect of technology in an attempt to highlight the objective, realist and non-mentalist nature of technology.
- Second, they invariably opine that the current ways of representing and studying technology-organisational change, via lenses such as structuration, practice, or emergent views, have not offered sufficient theoretical depth or empirical richness regarding the technology appropriation process.
- Third, they identify technology affordances as a promising means of analysing and researching the technology appropriation process—especially as a way to rectify the shortcomings of the earlier approaches.

In this regard, it is important to review the literature on the concept of “Affordances” and explore how it can be adopted in technology organisational change theories.

2.7.1. Affordances

According Leonardi (2012), “Materiality exists independent of people, but affordances and constraints do not”. He argues that people and organisations might come to materiality and/or engage with a technology with diverse goals and intentions and they perceive a technology as affording distinct possibilities for action. Whereas technology does not have intentions and goals to produce an outcome.

Materiality transcends and endures during time as technology has a fixed materiality; however, people’s perceptions of what functions a technology affords or do not afford (constraints) can vary across different contexts. On the other hand, people might perceive that an artefact offers no affordances for
action, and instead it could potentially constraint their ability to carry out their goals and intentions. It can be perceived that; affordances and constraints are emerged in the space between social and material agencies. Also, peoples’ intentions are articulated, to an important degree, by their perceptions of what a technology can or cannot do.

“Technology Affordances” is one of the main characteristics in theorising the material aspect of technology in organisational change studies. In this regard the “Affordances” concept will be explored in further detail to identify how it can help theorising IT enabled change.

Robey et al (2012) argue that before incorporating the concept of “Affordances” in IT impacts on organisations it is important to review the original development of the concept and also the application in other disciplines such as Sociology and Psychology. The term “Affordances” is rooted in ecological psychology in Gibson’s (1977, 1979) studies of ecologically based visual perception which explore how an animal interacts with the environment;

“The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill . . . I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment. (Gibson, 1979: 127)”

Gibson argues that information about affordances exists within the environment itself and can be directly perceived as in contrast with cognitive psychologists who believed that perception was entirely an internal mental process.

In sociology, Hutchby (2001) advocates using affordances as a way to counter the radical constructivist tendency to regard material reality as open to endless interpretation, which in turn tends to disregard the physical constraints imposed by material objects, including IT. Although Hutchby acknowledges the importance of social interpretation, as widely shown in social studies of technology, he uses affordances to draw attention to the material constraints on social action that cannot be removed through social interpretation.
In psychology, Norman (1988) uses the concept of affordance to focus attention on the design of computer interfaces. From a designer’s perspective, making the possibilities of technology use visible to a computer user is as important as restricting attempts to use a computer for activities that it cannot support. Interestingly, Norman’s work on affordances exhibits more emphasis on interpretation than on material objects. He even acknowledges at one point that: “I should have used the term ‘perceived affordance,’ for in design, we care much more about what the user perceives than what is actually true” (Norman, 2002).

Stoffregen (2003) notes that the definitions of affordances within ecological psychology generally fall into one of the following two categories:

- **Affordances are properties of the environment (Michaels, 2000; Reed, 1996; Turvey, 1992); or**
- **Affordances are relations between an animal and its environment (Chemero, 2003; Kirlik, 1995; Stoffregen, 2003).**

Representing the first category, Turvey (1992) formally defines affordances as dispositional properties of the environment that pose “real possibilities” for action. This definition allows for the prospective control of action, which Turvey considers essential to an accurate ontology of behaviour.

Theorizing affordances as invariant relations contradicts Gibson’s characterization of affordances as representing what an animal can potentially do, not what an animal must do. Stoffregen further suggests that “affordances sometimes are described as entities that constrain behaviour” (2003: 127), and yet properties of the environment alone cannot constrain behaviour.

In this systems approach to affordances, the direct perception of affordances eliminates the need to consider properties of the environment as separate from properties of animals. This makes the animal–environment system the unit of analysis and allows affordances to be specified and detected prospectively, which preserves the notion of prospective control proposed by Turvey (1992).
It also permits affordances to be seen as constraints on behaviour because behaviour may be constrained by the relationship between environmental and animal properties. Affordances in IS/IT studies has received consideration attention during the last few years. For instance, in the field of HCI (human computer interaction); this concept empowers researchers with an effective lens to analyse the relationship between human and technology (IT) (Basden 2008).

2.8. Theorising IT Organisational Change

According to Robey et al (2012), the need for theorizing the material aspects of IT is to define the theory’s basic elements, which would express the conceptual building blocks. However, it is not an easy task as few theories about organisational change incorporate material aspects of technology.

Robey et al (2012) argues that other disciplines and theories which addressed materiality would be a good source in terms of theory development in IT and organisational change. They argue that natural sciences, which began with scientific inquiry by trying to explain the physical world offer little guidance to the researchers for theorizing how physical properties of technologies intermingle on social systems such as organisations.

Robey et al (2012) argues that examining social science theories derived from sociology and psychology disciplines would be a promising start. Like many other concepts in the social sciences, the concept of affordances fits well with a functional explanation (Stinchcombe, 1968) that aims at understanding the functions that material objects play in human activities.

Robey et al (2012) argues that constructing novel theory is challenging as theorists might be accused of borrowing too heavily from other disciplines and not contributing to the original theory of their home disciplines. On the other hand, a novel theory may be rejected because it is too far removed from ongoing discourses. However, a middle ground through these challenges is to revise existing theories that nominally address IT but exclude or marginalize the material features of IT. Two examples of this middle ground strategy are illustrated here as follows;
2.8.1. Adaptive Structuration Theory

DeSanctis, & Poole (1994) developed the concept of “Adaptive Structuration Theory” and made an insightful contribution to the study of IT use and effect by employing the concepts of “Structural Features” and “Spirits”. Although Adaptive Structuration Theory (AST) has been used widely ever since, it has received criticisms that the concepts are not consistent with basic assumptions in Giddens’ structuration theory, on which the concept was derived.

Markus & Silver (2008) in a study of “A Foundation for the Study of IT Effects” reviewed the DeSanctis & Poole framework by adding materiality to the well-known adaptive structuration theory.

Robey et al (2012) state that AST was developed with IT applications in mind, specifically group support systems, and considers that IT artefacts have “structural features” and a “spirit” that embodies the intentions for which IT applications were designed.

Jones & Karsten (2008) criticise AST, by stating that technology is incapable of embedding structural features, as Giddens’ original version (1984) of structuration theory treats structure as virtual instead of tangible. Furthermore, the use of vague terms such as “spirit” and “faithful” to describe design intentions and appropriations, respectively, mystify the plausibility of AST.

In response to the received critics Markus & Silver (2008) propose the addition of three concepts to AST as;

- Technical Objects,
- Functional Affordances,
- Symbolic Expressions

Technical objects and functional affordances relate directly to materiality that was discussed earlier. As Robey et al (2012) argues, Markus and Silver use the concept of technical objects to restore materiality to DeSanctis and Poole’s concept of structural features. Technical objects include properties of IT artefacts, such as packaging, arrangement, and appearance, which exist apart from any functions or interpretations that users may bring to their relationship with IT.
Markus and Silver view technical objects as separate and distinct from human users, and their causal potential depends on how the user appropriates them. The causal potential of IT artefacts is best understood by including the second concept, namely functional affordances, as part of the explanation for IT impacts.

Markus and Silver define functional affordances as “the possibilities for goal oriented action afforded to specified user groups by technical objects” (Markus & Silver, 2008). Thus, affordances are not equivalent to technical objects but rather depend on the relationship between technical objects and a perceptive and motivated user. Their treatment of affordances conforms to Chemero’s argument (2003) that affordances are relations between the abilities of actors and features of the environment.

Markus and Silver also demonstrate the inherently functional nature of affordances by linking technical objects to goal-oriented behaviour. With a revised version of AST, researchers may direct research attention to specific technical objects, such as portable smart phones, cloud computing services, or integrated enterprise systems.

However, rather than treating technical features as determinants of user behaviour, research using AST should emphasize the functions that such technical objects provide for prospective users. Thus, for example, users of cloud computing services may appropriate the technology in ways that fulfil certain needs and not others. Likewise, users of smart phones and enterprise systems may find specific technical features valuable because they afford communication and integrated material control, respectively.

2.8.2. Organisational Routine Theory

Routines are a core component of any organisation, so they comprise a natural focus for studies of IT impacts on organisations. It was mentioned in the “Organisational Change” section in the literature review that, organisational change and stability can be explained by the interaction of organisational routines elements i.e. ostensive and performative.

According to Feldman & Pentland (2003), a routine may contribute to organisational inertia if it re-enacts an established pattern of action, but a
routine may also generate new patterns of action. Feldman & Pentland (2003) argue that neither aspect alone is sufficient to describe the properties of organisational routines. They argue that routines are “generative systems” capable of producing a wide variety of performances depending on the circumstances.

Each performance of a routine is partly (re)-enacted from past experience, and partly improvised based on current circumstances and future goals (Pentland & Feldman, 2008). Although Feldman & Pentland (2003) explored the concept of routines and their components namely; Ostensive and Performative, they didn’t consider either technology or IT in their theoretical consideration of routines.

Pentland & Feldman (2005) note that, although IT artefact may embed a vision of organisational work process; IT artefacts are external to routines. IT artefacts may have the capacity to influence and represent routines but do not have the capacity to become part of the generative system (Robey et al 2012).

Recently, there has been studies in the impact of IT on organisations with the focus on organisational routines, through which scholars extended the theory of organisational routines and added another dimension to the so-called ostensive and performative (D’Adderio’s 2008, 2011, Volkoff et al 2007).

Robey et al (2012) justify this extension with two arguments as follows;

- The first argument is, some and not all IT artefacts can become embedded into organisational routines to the degree that routines could be performed without the artefact’s presence.
- The second argument is; once IT artefact is embedded into routines it acquires a material property or as Robey et al (2012) call it; “material agents” and it contributes and become part of the “generative system”.

Artefacts become embedded into organisational routines through a process of adaptation and selection, similar to the way that IT applications are appropriated as described by AST (DeSanctis & Poole, 1994). This is consistent with D’Adderio’s argument (2011), that artefacts can both influence the course of routines and evolve themselves as a consequence of their appropriation in specific contexts.
According to D'Adderio (2011), IT artefacts produce various degrees of influence, from no influence to full influence. In other words, people (performer of the routines) in organisations might be forced to use IT, for instance, in specific accounting software, to perform the routine. In the case of no influence artefacts may be discarded, ignored, merely used as accessories, such as calculator instead of accounting software (which might not be used occasionally). This produces a range of possibilities by which artefacts can shape and be shaped by the performances of organisational routines.

Leonardi (2011) argues that “Embedded IT Artefacts” may acquire the status of material agents, interacting closely with human agents in the performance of organisational routines. Material agency can be defined as the capacity of artefacts to act independently of human action (Pickering, 1995).

Robey et al (2012) made an analogy between considering agency for IT artefact which could potentially an impact regardless of human being to natural phenomena i.e. wind and water have material properties that are capable of exerting agency on their own, rather than depending on the interpretations or interventions of social actors.

According to Robey et al (2012), routines can be shaped by both IT artefacts and human agents. They explain that material aspect of routines i.e. IT artefact can act like the ostensive aspect of organisational routines, and play a guiding role for human action in organisational routines. By embedding organisational elements such as routines, data, and roles, IT artefacts serve as a template for behaviour by influencing what actions ought to be taken (Volkoff et al., 2007).

Moreover, embedded IT artefacts can play a constraining role for human action in organisational routines. Networked technologies such as workflow systems, for example, constrain individual human actions in part, by constraining the actions of linked users. Although they can choose to bypass the software, their boycott holds consequences for their ability to have their work accepted by others in the organisation (D'Adderio, 2008).

Robey et al (2012) also argue that, embedded IT artefacts could potentially monitor the performances of organisational routines, identify inconsistencies and abnormal actions which would need clarification, and enforce compliance.
to standard procedures. Software makes performances more visible across an organisation, thereby enhancing control.

Finally, Robey et al (2012) argue that, embedded IT artefacts could potentially give the human actors a legitimate role in performing the routines; this could be done by codifying the organisational rules and values embedded in IT artefacts. D'Adderio’s (2011) also confirms this, by stating that; interests, intentions, assumptions, rationales, and logics could be embedded in the artefacts and once embedded, artefacts can lend a sense of appropriateness to particular human actions and justify the routine. Furthermore, embedded IT artefacts may also act as material agents in the performative aspect of organisational routines, potentially altering the ostensive aspect.

This is consistent with a relational view of affordances (Chemero, 2003; Stoffregen, 2003), in which routines may be seen as possibilities for action that depend on both the material properties of objects and the ability of actors to perceive and use them.

Robey et al (2012) argue that many IT artefacts take time to be fully perceived by human agents, and actors may perceive and use new affordances over time as they learn and experiment with them. Thus, embedded IT artefacts may contribute to the creation of new performances of organisational routines and, over time, help to establish more enduring changes in interdependent patterns of actions.

Acknowledging the material aspects of organisational routines in the traditional organisational routines theory by Pentland & Feldman (2003), enables researchers to explicate the stability and change without only focusing on human actors. By treating embedded material IT artefacts as part of the generative system of organisational routines, researchers may be less inclined to treat IT as an external or invariant influence on organisational routines. For instance, by treating accounting software packages as part of a routine, researchers may be less likely to hypothesise the impact of IT on accounting practice and attend more directly to the sociomaterial practice of accounting.
Integrating the materiality of IT artefacts within established theory thus promotes greater sensitivity to the close interdependence between material and human agencies (Robey et al 2012).

2.9. Organisational Routines & Enterprise Systems

Enterprise systems and software packages embody organisational routines (Volkoff et al. 2007). Berente et al (2016) argue that Enterprise System (ES) artefacts dictate and embody the ostensive aspect of routine and shape the performative aspect.

From the functional point of view these routines could be defined as sequences of actions that have well-defined objectives, and are typically performed by business users in specific contexts.

Failure of business process management (BPM) and/or process “design” or “redesign” initiatives, can often be traced back to a fundamental misunderstanding of what organisational routines are. This is a point that many system architects, designers and even managers / executives would do well to understand.

As Pentland & Feldman (2008) state that;

... “the frequent disconnect between [system or design] goals and results arises, at least in part, because people design artefacts when they want patterns of action...it is believed that designing things while hoping for patterns of action is a mistake. The problem begins with a failure to understand the nature of organisational routines, which are the foundation of any work process that involves coordination among multiple actors... even today, organisational routines are widely misunderstood as rigid, mundane, mindless, and explicitly stored somewhere. With these mistaken assumptions as a starting point, designing new work routines would seem to be a simple matter of creating new checklists, rules, procedures, and software. Once in place, these material artefacts will determine patterns of action: software will be used, checklists will get checked, and rules will be followed”
The fundamental misunderstanding is that design artefacts, checklists, and rules and procedures encoded in software are mistaken for the routine instead of being seen for what they are: idealised representations of the routine. Many software projects fail because designers do not understand what the routines actually are.

### 2.10. Summary of the Literature Review

This chapter outlines important concept of organisational change considering materiality and technology in general and ES in particular. Various dimensions (Technology Affordances & Organisational Routines) in terms of change process supported by literature have been identified and two recent theoretical frameworks in IT enabled organisational change were explored further.

A detailed literature review on the main concepts of the thesis was conducted. Although there has been a lot of research in ES in various domains, however the industry results show that organisations still struggle to get the potential benefits of ES and as Kader & Nguyen (2011) indicate that, more than half of the ERP projects fail due to complexity and wide scope of ERP system. Organisations fail partly due to misunderstanding of the ES concept and unable to perceive the changes impacted by IT. The recent theoretical framework shows that process research in organisational change considering IT, is still in its infancy and organisations need to explore these changes beyond the traditional theoretical and methodological paradigms.

The next chapter will develop a theoretical framework on the change process considering ES application based on the main components of organisational routines elements and the concept of affordances which were identified in the literature review and main principles of “Critical Realism” as Meta-Theory.
3. Chapter Three — Theoretical Framework

3.0. Introduction

The main objective of this chapter is to construct a legitimate and plausible theoretical framework for conducting this research. The theoretical framework of this research is methodologically and philosophically driven by “Critical Realism” paradigm. CR in terms of philosophical paradigm and appropriated methodology will be discussed in chapter 4 in detail. In this regard it is suggested to read chapter three and chapter four of this thesis together, in case there are some terms and concepts which are used in this chapter in the abstract form.

This chapter falls into six parts. On the first part, nature of theories in IS/IT will be explored in further. The reason to explore the nature of theories in IS/IT is that Enterprise System (ES) applications are considered as IS/IT software packages.

The second section of this chapter will explore and critically evaluate the interplay between theory and method and how these two important elements of a research shape each other in a recursive way.

The third section of this chapter will engage with Critical Realism (CR) as Meta-Theory. The objective of this section is briefly introducing CR and how it can help the researchers to theorise about the “Area of Concern” holistically.

The fourth section of this chapter, will introduce in further details various components of the theoretical framework i.e. “Organisational Routines Components” and “Generative Mechanisms” and “Affordances”.

The fifth section will present the conceptual theoretical framework and discusses how this framework needs to be used in an empirical setting. A summary of the chapter will be presented at the end.
3.1. Nature of Theories in Information System Research

The field of “Information Systems” has been around since the 1960s (Hirschheim & Klein 2012) and has been developing ever since while sharing boundaries with other disciplines such as, organisation theory, psychology, economics, sociology, mathematics, linguistics, accounting, computer science, operations research, semiotics and etc.

The concern over information system phenomena and dilemmas has been growing with respect to the philosophical and methodological development as one’s philosophical stance and methodological paradigm could alter the theoretical paradigm and area of concern significantly (Chen & Hirschheim 2004).

In this regard, it is important to explore theory in relation to a wider methodological and paradigmatic lens in order to have a holistic understanding about nature and the role of theory in the research. It is equally important to see how a theoretical framework communicates with other components of the research.

In order to explore what is theory in information system we briefly engage with some philosophical dimensions of theory by one of the most influential articles in information system (IS) research. Gregor (2006) who critically explored the nature of theory in “Information System” by setting the context with four interrelated and fundamental categories about body of knowledge and theories in a discipline as follows;

1- **Domain questions.** What phenomena are of interest in the discipline?

2. **Structural or ontological questions.** What is a theory?

3. **Epistemological questions.** How is a theory constructed?

4. **Socio-political questions.** How is the disciplinary knowledge understood by stakeholders against the backdrop of human affairs?

Gregor (2006) argues that “structural or ontological questions” i.e. “What is a theory” and “How a theory is constructed” has received little attention among other three classes.
As mentioned earlier these dimensions of a theory are intertwined and interrelated in a sense that epistemological assumptions (question three) can have implicit expectation about ontological dimension i.e. “Nature of Theory”.

Gregor (2006) discusses that epistemological questions have also received considerable attention with references to several articles that argue the merits of different paradigms for conducting research in IS. The debate is framed in two broad research paradigms i.e. positivist and interpretivist.

Gregor (2006) argues that, there has been little attention or no recognition in IS with a view that the adopted research approach, could vary with different types of theory in IS. It can be argued that, in order to view a theory and its component in an ontological level with a holistic epistemological lens, we need to shift our focus towards the real problems in IS and consequently primary goals of theories which frame the “Area of Concern”.

In this regard, Gregor (2006) depicts taxonomy of theory types in IS research (See; Table 3.1), considering their important attributes and primary goals and theory components (Table. 3.2).

Table 3-1. Taxonomy of Theory Types in Information Systems Research

<table>
<thead>
<tr>
<th>Theory Type</th>
<th>Distinguishing Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>Says what is. The theory does not extend beyond analysis and description. No causal relationships among phenomena are specified and no predictions are made.</td>
</tr>
<tr>
<td>Explanation</td>
<td>Says what is, how, why, when, and where. The theory provides explanations but does not aim to predict with any precision. There are no testable propositions.</td>
</tr>
<tr>
<td>Prediction</td>
<td>Says what is and what will be. The theory provides predictions and has testable propositions but does not have well-developed justificatory causal explanations.</td>
</tr>
<tr>
<td>Explanation &amp; Prediction (EP)</td>
<td>Says what is, how, why, when, where, and what will be. Provides predictions and has both testable propositions and causal explanations.</td>
</tr>
<tr>
<td>Design &amp; Action</td>
<td>Says how to do something. The theory gives explicit prescriptions (e.g., methods, techniques, principles of form and function) for constructing an artefact</td>
</tr>
</tbody>
</table>

Source: Gregor (2006)
Table 3-2: Theory component with reference to theory purpose

<table>
<thead>
<tr>
<th>Theory Component (Components Contingent on Theory Purpose)</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causal explanations</td>
<td>The Theory gives statements of relationship among phenomena that show causal reasoning (not covering law or probabilistic reasoning alone).</td>
</tr>
<tr>
<td>Testable propositions (hypotheses)</td>
<td>Statements of relationships between constructs are stated in such a form that they can be tested empirically.</td>
</tr>
<tr>
<td>Prescriptive statements</td>
<td>Statements in the theory specify how people can accomplish something in practice. (e.g., construct an artefact or develop a strategy).</td>
</tr>
</tbody>
</table>

Source: Gregor (2006)

Gregor (2006) argues that an ontological stance towards theory is aligned with various conceptions of theory as expressed by Habermas and Popper. For instance, Popper views the world as three interrelated levels where “World One is the objective world of material things; World Two is the subjective world of mental states; and World Three is an objectively existing but abstract world of man-made entities: language, mathematics, knowledge, science, art, ethics, and institutions. Thus, theory as an abstract entity belongs to World Three. An individual can have a subjective view of what a theory means, at which point an understanding of the theory resides in a personal World Two (Gregor 2006).”

Various perspectives about the aim of theories at a general level, shows that, theories aim at describing the phenomena, explaining and enhancing researchers’ understanding of the world and, sometimes to providing predictions about the future.

It could be argued that a lack of holistic methodology for IS in the current digital world is more of a philosophical problem than a theoretical issue. In this regard, in the next section, the interplay of theory and method will be explored in further depth.
3.2. The Interplay of Theory & Method

According to Van maanen et al (2007), the aim of research in organisational and management context is to speculate, understand/discover the problems and area of concern in further. Ultimately research aims to inform practice in the form of order, explanation and prediction of observed social processes and structures that characterize behaviour in and of organisations. They argued that in this process, theory and method in terms of researchers’ instruments & lenses are extremely important as they are built up and developed by our representations and mental models of organisational phenomena and “Area of Concern”.

Despite their importance as descriptive and prescriptive nature they are regarded as conceptually independent to the “Area of Concern”. Baskerville & Wood-Harper (1996) in the context of IS argued that “Action Research” merges research (theory and method) with praxis and consequently produces appropriate research findings which informs practice and hence theory and method. As Van maanen et al (2007) noted, theories without methodological contributions and methods without theoretical substance and just providing some empirical findings can be irrelevant in practice and any narrative suggesting an orderly, standard model of the research process is rather misleading.

Van maanen et al (2007) stated that method can spawn theory as well as shape theory boundaries and vice versa. In this back-and-forth process; concepts and data are in continuous interaction and development. Or as Weick (1989) puts it; theory construction is hemmed in by methodological paradigms. However authors might be unaware or unconscious of philosophical and paradigmatic dimensions of their methodology which underpinned their assumptions and consequently their research.

As it is argued above theory and method are intertwined and they are shaped in a dynamic interaction with the “Area of Concern”. It can also be perceived, the significance of a holistic philosophical paradigm towards research. In other words, a more holistic philosophical lens contributes to effective theorising and also structuring the problems and area of concern with more rational and legitimate boundaries.
Critical Realism as the main philosophy for conducting this research will be critically evaluated in the context of IS and Organisational Change in further in chapter four. However, as the theoretical framework of this research has been constructed based on the main elements of CR philosophy, it is important to mention the role of CR in theorising and its link to the theoretical development.

3.3. Critical Realism as a Meta-Theory

Critical Realism in its current form is considered as Meta-Theory (Fleetwood 2014). Bhaskar states that the deployment of empirical research methods needs to be underpinned by a meta-theory, such as empiricism, critical realism or pragmatism and hence there is a rational relationship between Ontology, Epistemology and Method (Scott 2010).

According to meta-theory valid knowledge from a philosophical point of view has three characteristics i.e. Ontological Realism, Epistemological Relativism and Judgemental Rationality. Ontological Realism states that realist ontology is a necessary precondition of any engagement with the world, however CR claims to have taken the principle of realism further than any Western philosophical system thus far. The claim is that the world is not only real but it must also be differentiated, structured, layered and possesses causal powers, otherwise our knowledge of it—or our being—would not be possible (Patomaki 2002).

The second characteristic is that epistemology is relative to the activities and belief systems of groups of people in time and space. The third characteristic is considered as “Judgemental rationality” and it indicates that, this doesn’t imply that a theory about the world has the same truth value as any other; in other words, it is possible to decide between different accounts when they refer to the same object.

Critical realists make the assumption that an ontological theory presupposes an epistemological theory; and further to this, meta-theory influences the methodological level i.e. the way data are collected and analysed (Scott 2010).
3.4. Dimensions of Theoretical Framework

3.4.1. Organisational Routines

Organisational routines as an important vehicle of stability and change have been explored in the literature review in chapter two. However in this chapter, various organisational routine elements will be explored in further details as they comprise important dimensions of the conceptual theoretical framework on organisational change.

In current theoretical literature on organisational routines, routines are perceived as having two conceptual dimensions and those are ostensive and performative. Ostensive and performative dimensions are mutually interrelated and intermingled and it is not possible to explain the idea of routine just by one dimension (Pentland et al 2012).

3.4.1.1. Ostensive Aspect of Routines

Ostensive aspect of a routine is considered as the generalised or abstract idea of a routine. Feldman & Pentland (2003) consider ostensive dimension as a structural aspect and or history. This dimension is shaped and re-shaped by the other dimension which is called the performative dimension (Feldman & Pentland 2003).

In other literature, the ostensive aspects are called as ‘dispositions’ (Hodgson and Knudsen, 2004, 2010) or organisational ‘skills’ (Nelson and Winter, 1982).

3.4.1.2. Performative Aspect of Routines

The performative aspect of routines is the concrete level of routine which is characterised by specific actions and performances of specific people at specific time and place.

Pentland & Feldman (2005) argue that, in order to explain organisational change and stability, scholars should consider the recursive relationship between routine elements. In other words, people shape the routines through their actions and performances (performative) and their actions and behaviour are re-shaped by an ostensive aspect.
The recursive relationship between action (Performative) and history (Ostensive) has been considered as path dependence (Sydow et al., 2009; Vergne & Durand, 2010) or path creation (Garud et al., 2010).

Pentland et al (2012) refer to path dependence as the process through which “past actions influence the likelihood of future actions”.

The schematic of organisational routine elements influenced by artefact is depicted in Figure 3.3.

3.4.1.3. Material aspect of Routines

It was explored in the literature review chapter that although Feldman & Pentland (2003), explored the concept of routines and the components namely Ostensive and Performative, they didn’t consider either technology or IT artefact in the theoretical consideration of routines.

Recently, studies have been conducted on the impact of IT on organisations with the focus on organisational routines, through which scholars extended the theory of organisational routines and added another dimension (Material Dimension) to the so-called ostensive and performative (Volkoff et al 2007; D’Adderio’s 2008, 2011.).
3.4.2. Organisational Routines in CR Stratified Ontology

From an ontological sense in Critical realism (CR) which has been discussed briefly at the beginning of this chapter and will be introduced in detail in chapter 4, reality is considered in three nested domains namely; “Reality, Actual, Empirical” (Bhaskar 1998).

Fleetwood (2005) argues that the domain of “Real” consists of material artefacts, conceptual entities (such as culture, language) and social structures. These artefacts can exist independently of our perception of them. Volkoff & Strong (2013) argue that the “Real” layer is associated with mechanisms that generate events and outcomes which might not be observed.

In stratified ontology of CR, those events that are not observed but are positioned in the actual domain and those which are observed, experienced and empirically tested by people, are positioned in the empirical domain.

According to Volkoff et al (2007), critical realists carefully detach structure and agency and while structure and agency are distinct, they cannot exist without each other. Volkoff et al (2007) also argue that social structures logically predate the practices and experience of them.

For instance, Bhaskar (1998) mentions to the structure of family i.e. family structure (as a social structure) necessarily pre-exist individual (agency) experience of it. Although through agents’ practices, structures may transform, emerge and or change, these changes to structures postdate those actions (Collier 1994, Volkoff et al 2007, Faulkner & Runde 2013).

The above argument on stratified ontology of CR is aligned with organisational routines elements i.e. Ostensive, Performative and Material. According to Dionysiou & Tsoukas (2013), cited from Feldman & Pentland (2003), routines incorporate a duality of structure and agency. Pentland & Feldman (2008) argue that ostensive and performative aspects for routines correspond to structural and agential parts respectively in an ontological sense. Furthermore, ES as a source of structural conditioning and its existing materiality (IT artefacts) exist independently of our perception of it and it can be positioned in the real domain of stratified ontology of CR.
Volkoff et al (2007) argue that, ES exists in the empirical domain only at the moment of instantiation (or technology in use). In this regard and from the abovementioned argument, performative aspects of routines can be located in the empirical domain, and the ostensive aspect can be located in the actual domain. The material aspect (ES artefact) would be located in the Real domain of CR stratified ontology. See Figure 3.2.

It has been suggested that organisational routines are considered as generative systems or vehicles of change in organisations (Feldman & Pentland, 2003; Pentland & Feldman, 2005). It is important to investigate how that generative system works, considering enterprise systems application (Technology) or materiality.

In Chapter 2, “Technology Affordances” as an important element in theorising IT enabled organisational change has been discussed broadly. In the following section of this chapter, “Enterprise Systems Affordances” as an important element of conceptual theoretical framework will be explored in further depth.
3.4.3. Enterprise Systems Affordances

“Technology Affordances” is one of the main characteristics in theorising the material aspect of technology in organisational change studies (Robey et al. 2012).

As discussed in the literature review (chapter 2.), various views on affordances, which are rooted in social science disciplines such as sociology, psychology, anthropology etc., can be considered. However, the term was initially studied by Gibson in ecological psychology (Gibson 1977, 1979).

In this research, system approach or relational view on affordances (as an opportunity for action) has been adopted (Chemero, 2003; Stoffregen, 2003) in alignment with D’adderio’s (2011) view on technology affordances and which defines technology affordances as the relationship between human agents and technology artefacts.

According to Markus & Silver (2008), cited in Leonardi (2011), relational concept of affordances is the property between what human perceive and the property that technologies offer. However, the property that an artefact/technology offers is a necessary condition but not sufficient for changes in action.

Markus & Silver (2008) argue that action is a goal-oriented process and technology on its own without the intention of human cannot exert influence. In other words, affordances arise when a person interprets a technology through his or her goals for action; Markus and Silver define affordances as “the possibilities for goal oriented action afforded to specific user groups by technical objects”.

If we accept affordances as relational concept which exist between people perception and an artefact’s materiality, then artefacts might be used in numerous ways and have multiple effects on the organisation of work (Fayard & Weeks 2007; Zamutto et al. 2007).
3.4.4. Generative Mechanisms as ES Affordances

According to Volkoff & Strong (2013), the essence of critical realist driven research is identifying the generative mechanisms which influence and affect organisational elements and in this research organisational routines.

Volkoff & Strong (2013) argue that predictive theories (which are discussed in the nature of theory in this chapter) are based on statistical correlations and can only reveal what may happen, under the closed systems (laboratory settings) conditions in which the outcome might be debatable.

However, by going dip down in terms of observation and exploring of the generative mechanisms in play through retroduction (which will be discussed in detail in chapter 4.) researcher can inform practice in a sense of how and why things change or do not change; as this research demonstrates.

In critical realist literature, generative mechanisms have been described as “the ways of acting of a thing” (Bhaskar 1998b). Sayer (2010) refers to generative mechanisms as “the causal powers and liabilities of objects or relations”, and Bygstad (2010) considers it as “capacities for behaviour”. Smith (2006) refers to generative mechanisms as “tendencies of structures”.

Volkoff & Strong (2013) argue that, it is possible to interpret the concept of acting as “having an effect” on something or in other words influencing something by causal powers. Bhaskar (1998) defines materiality in real domain as “Ensemble of Powers” with the capacities or tendencies which has the potential to generate effect.

In other words, a mechanism has the potential to cause an event, but may or may not be actualised in the actual domain. Mechanisms simultaneously exert powers and threaten liabilities: they can both enable and constrain action (Volkoff & Strong 2013).

In an IS study Bygstad (2010) explores two generative mechanisms. These are innovation mechanism and the service mechanism. He used these mechanisms to explain how innovation in ICT-based services unfolds.

Volkoff & Strong (2013) propose that the concept of affordances has been used in IS/IT literature inconsistently in recent years. The concept considering its
root (i.e. ecological psychology of Gibson (1977)) as a relational view, (as been discussed earlier) is developing and is highly aligned with the concept of generative mechanisms in CR research and specifically in IS/IT and organisational change literature.

The following justifications help the audience to perceive the affordances concept as part of generative mechanisms;

- Affordances like mechanisms exist whether or not it is exercised by agents (Sayer 2010). Furthermore, affordances might never be actualized (or even perceived) as like generative mechanisms and it can be situated in the “Real” domain of stratified ontology.
- Stoffregen (2003) argues, that the affordances cannot be actualized unless (brought into the domain of the actual) unless someone perceives it and has the capability or an intention or goal to connect with it i.e. actualizing the affordances.
- The relational nature of affordances has been reconsidered in a study by Kane et al. (2011) who identified four affordances whereby social media support intellectual capital creation. For example, one of the affordances is meta-voicing, the potential for people to raise their voice and give feedback in an online social media platform.

An important element that can be added to the affordances concept from ecological psychology to IS research, is that, in IS/IT and organisational studies, we are no longer dealing with just individual goals and actions, but also with groups and organisational goals, and the coordinated actions of groups of people to support them (Volkoff & Strong 2013).

According to Markus & Silver (2008), ecological psychology has its root in realism which further reaffirms the parallels description between affordances and the generative mechanisms. As in both, it can be seen as a potential for an event to occur, rather than the event itself.

Volkoff & Strong (2013) argue that, generative mechanism is a broader concept as affordances arises from the relation between a structure or object i.e.
(Ostensive aspect of a routine or ES itself) and an agent goal-directed actor or actors (Performative aspect of the routine).

However generative mechanisms may arise from structures alone and their causal powers triggered without the intervention of an actor. Thus, affordances are a type or subset of generative mechanisms. In Enterprise System research, when the question is how IT artefact/ES affects an organisation, then it is useful to consider affordance concept as a subset of generative mechanisms.

In organisation studies in order to see affordances between ES and an organisation, Volkoff & Strong (2013) argue that the actualization of affordances occurs over time. They argue that a single actor who is engaging to work with an ES could be able to identify a variety of possible affordances.

However, in organisational settings an actor may be an individual or a collective such as an organisation’s team/department. The affordances that exist for the team may be different from the affordances that exist for individual members of the team.

Tsoukas (1989) argues that, in organisational and management context, control and cooperation could be considered as two opposite forces or generative mechanisms.

“Control and cooperation are two opposite generative mechanisms whose respective realization is dependent on contingent circumstances facing organisations. Certain conditions may favour cooperation at the expense of control, or vice versa, and this will be reflected in the design of organisational systems. Whatever the outcome may be, either a more cooperative or a more coercive organisation design, respectively, this does not mean that the opposite generative mechanism (control or cooperation, respectively) has been absent. It means, rather, that there is a dominance of one mechanism over the other under that particular set of contingencies. It is up to the social scientist to construct the conditions of closure so that the real and actual domains can be merged”.
3.5. A Conceptual Framework on Organisational Routines Change by ES

The conceptual theoretical framework of this research (Figure 3.3) has been developed by the extension of the theory of organisational routine and viewing the interaction between various elements in an epistemological sense through stratified ontology of CR. In an epistemological sense, relational approach towards affordances has been used and it is considered as part of generative mechanisms. Adopting a critical realist perspective through relational approach towards affordances (ES – Organisation Affordances) allows us to explore how ES applications enable and constrain change.

3.5.1. ES Embeddedness and Organisational Change

The conceptual theoretical framework will be explored further during the entire process of the research. In other words, the developed theoretical framework can be considered as a guide (Maxwell 2013) in the narrative inquiry as the implementation of the research. This theoretical framework is also considered in the narrative plot and during the process of data collection (semi-structured interview from ES designers).
3.6. Summary

In this chapter the significance of theory in research and its interplay with method has been explored in detail. Furthermore, the conceptual theoretical framework based on important dimensions of organisational routine (as vehicle of change and stability) has been developed.

The next chapter explored the research methodology of the study conducted for this thesis. Philosophical paradigm will be related to the research method and the strategy and data analysis will be critically evaluated.
4. **CHAPTER FOUR – METHODOLOGY**

### 4.0. Introduction

“Research method can be seen as an instrument for provoking a response from the world. The nature of the response depends on both the world and the instrument. Different methods generate information about different aspects of the world. The information is used to construct theories about the world, which in turn condition our experience of the world”.

*(Mingers 2001)*

Chapter two has provided details of literature on the process of organisational change considering enterprise systems. In chapter three, theoretical framework (F) which is methodologically driven and conceptually intermingles with stratified ontology of critical realism has been explored in further depth.

This chapter will explore the methodology in general and philosophical and methodological considerations of Critical Realism which is the main focus of this research will be presented. Critical Realism is considered as the main lens in my research in terms of constructing the observations on how I view the area of concern (organisational change) and how I view the theories in organisational change considering enterprise systems application. The interplay between theories and methods has been explored in the theoretical framework chapter in further details.

In the first section of this chapter, an overview of research design and its importance in terms of coherence and integrity in research will be explored. In the subsection of the research design description, a research onion framework (Figure 4.1), as adapted from Saunders et al (2016), depicts the overall consideration for the design of this research.

The 3rd section of methodology will explore philosophy of social science briefly. The thesis then engages with critical realism philosophy as the main philosophy for this research in further in the 4th section. CR main arguments towards
interpretivism and positivism and important dimensions of CR (Ontology, Epistemology and Methodology) are explored in detail in the subsection of philosophical consideration of this chapter.

In the 5th section of methodology, the thesis then engages with various forms of reasoning and logic namely inductive, deductive and abductive approaches. Retroduction as a form of reasoning in CR research will also be explored and justified in further.

In the 6th section of the methodology chapter, I will explore research method choices in organisational change and information system research in general. In the subsection of this part, a qualitative research method will be justified for this research.

In the 7th section of the methodology chapter, I will explore in further on the implementation of research (research strategy) and narrative inquiry as the sole research strategy for this research. This section will justify the choice of research strategy.

In the 8th section of the methodology chapter, data collection and analysis consideration for narrative inquiry will be explored in further.

Finally, I will explore the validity in research and empirical corroboration in CR research in further detail. Section 8th and 9th give an overview and justification of adopted methods and detailed implementation of the research based on these lenses viewed in chapter six and chapter seven.
4.1. Research Design

According to Saunders et al (2016), research design is the overall plan or systematic approach towards answering the research questions. In simple words, research design is about what the researcher wants to achieve and how the researcher wants to achieve it. It is also an interactive and dynamic process in a way that each components of the research i.e. Area of concern (A), Theoretical Framework (F) and Methodology (M) need to communicate with each part through the whole process of the research (Baskerville & Wood-Harper 1996).

Saunders et al (2016) emphasis on the importance of clear research questions which can be revised throughout the process of the research. Clear objectives derived the research questions, identifying the sources from which the data would be collected, how the data would be analysed and discussed are the important considerations in the design of the research as well.

The conceptual map of the research methodology (Figure 4.1.) shows the details of methodological considerations for this research i.e. the dotted circle lines are the adopted choices. The conceptual map of the methodology adapted from research onion framework of Saunders et al (2016) shows the broader considerations of each components of the methodology for this research. The justification of each dimensions of methodology will be critically evaluated as Saunders et al (2016) emphasise on the justification of adopted choices which need to be based on the nature of the research questions and objectives. The justification of the adopted choices should be aligned with the wider philosophical consideration which demonstrates coherence and rigour across the research design.
4.2. Research Onion Framework

Figure 4-1: Research Onion Framework - Research Design

Source: Saunders et al (2016)
4.3. Philosophy in Social Science

Philosophy of a research reflects an overall assumption about the way a researcher views the world and influences other components of a research i.e. research questions, research strategies and methods. Philosophy demonstrates deeper significance of the whole process of the research (Saunders 2016).

As it was shown in the research onion framework, research philosophies are positioned in the outer layer of the onion and adopting one specific philosophy shapes the overall structure of the research. Johnson & Clark (2006) note that as an academic researcher, we need to be aware of the philosophical commitments we make through our choice of research strategy since this will have a significant impact not only on what we do but how we understand what it is we are exploring.

The philosophical approach that the author considers for this research is “Critical Realism” (CR). In the following section, the main principles of CR and the justification of CR for conducting research in information system (IS) in a broad level and in particular for this study will be explored further.

4.4. Philosophical Consideration in Critical Realism

Critical Realism Philosophy was developed by Roy Bhaskar (The originator of CR Philosophy (15 May 1944 – 19 November 2014)) and extended through years from realism towards CR, Dialectic Critical Realism (DCR) and in contemporary social science research is considered as meta-theory (Fleetwood 2014).

CR has been the attention of academic scholars in various disciplines (Ackroyd & Fleetwood 2000; Danermark et al. 2002; Fleetwood 2004; Fleetwood & Ackroyd 2002), in the past 15 years and the philosophical approach and paradigm and various research methodologies has been developing extensively considering empirical research in various fields to name a few information System and IT, social organising etc. (Dobson 2001; Smith 2006; Mingers 2004a; Mutch 2010, 2013; Volkoff et al. 2007; Wynn & Williams 2012).

Mingers et al (2013) state that Critical realism in the context of information system research do proposes novel and exciting outlook in shifting the research
focus towards the real problems that we face and their underlying causes, and away from a data-centred research and methods of analysis. Moreover, CR offers a robust framework for the use of a variety of methods (eclectic) in order to gain a better understanding of the meaning and significance of information systems in the contemporary world.

According to Wynn & Williams (2012), the philosophy of Critical realism (CR) is getting further acceptance and recognized as a viable paradigm in social science research. They also argue that, research methodologies which are being constructed and are influenced by critical realism offer academic scholars, new avenues to critically explore complex organisational phenomena in a holistic manner.

In the context of Information System (IS), Lee (2004) argues that CR-based research with the focus on real world problems in an ontological sense can accommodate information system theorising effectively and create novel IS theories that are systems-oriented. In the sense of theory making CR philosophy is considered as a meta-theory as it can capture further dimensions of phenomena due to its open system consideration and it identifies the generative mechanisms which connect “chains of indeterminate events and complex interactions” (Grover et al. 2008, p. 45).

Markus & Silver (2008) argue that, CR allows researchers to develop in depth causal explanations for the outcomes of specific sociotechnical phenomena and also emphasise that adopting CR philosophy can effectively explore the role of IT in observed technology uses and effects.

According to Mingers et al (2013), the main tenets of CR in terms of ontology, epistemology and various types of knowledge are as follows;

- CR supports a strongly realist ontology that there is an existing, causally efficacious, world independent of our knowledge. It defends this against both classical positivism that would reduce the world to that which can be empirically observed and measured, and the various forms of constructivism that would reduce the world to our human knowledge of it. Hence it is realist.
• CR recognizes that our access to this world is in fact limited and always mediated by our perceptual and theoretical lenses. It accepts epistemic relativity (that knowledge is always local and historical), but not judgmental relativity (that all viewpoints must be equally valid). Hence it is critical in a Kantian sense.

• CR accepts the existence of different types of objects of knowledge—physical, social, and conceptual—which have different ontological and epistemological characteristics. They therefore require a range of different research methods and methodologies to access them. Since a particular object of research may well have different characteristics, it is likely that a mixed-method research strategy (i.e., a variety of methods (eclectic) in the same research study) will be necessary and CR supports this.

4.4.1. CR main Arguments towards positivism & Interpretivism

According to Dean et al (2006), some critical issues have not been addressed sufficiently in the philosophy contribution in the practice of social science. These issues include the dichotomy of material-ideal and also failure to theorise the human world (knowledge) from socio-historical nature point of view. It is also necessary to reemphasise the dilemma of ontology which most philosophers believe that, it has been neglected.

Dean et al (2006) argue that, one of the most important questions in the philosophy of social science is whether, it can really be considered as a science. The literature to meeting this end have been organised on the basis of two extreme approaches on the philosophy classified as positivism and interpretivism.

Critical Realism argues that neither positivism nor pure social constructionism/interpretivism can effectively explain the reality and dilemmas. CR defends that events necessitate some form of realist ontology (Bhaskar 1975).

CR states that there has to be some intransitive domain of object and events, independent of our perceptions of them, which can indeed become objects of our knowledge. Moreover, CR argument can be expressed in terms of the
mistake that both Positivism/empiricism and strong forms social constructivism/interpretivism make— that is, the epistemic fallacy (Bhaskar 1986).

According to Mingers et al (2013), epistemic fallacy can be expressed in terms of, reducing the ontological domain of existence to the epistemological domain of knowledge. In other words, statements about being are reduced and translated into human’s knowledge or experience of being.

For the positivist/empiricist, that which cannot be experienced and/or perceived cannot exist and for the conventionalist and strong form of social constructivism, limitations of our knowledge of being are taken to be limitations on being itself. In contrast, the realist asserts the primacy of ontology: the world would exist whether or not humans did.

A holistic explanation and discussion on Ontology, Epistemology and methodology in critical realism will be offered in next sections.

**4.4.2. Ontology in Critical Realism**

According to Wynn & Williams (2012), cited from Orlikowski & Baroudi (1991) ontology is concerned with the nature of objects being studied, including the nature and characteristics of the various entities that exist in the world, and whether this reality exists objectively or subjectively relative to humans.

Ontology in CR is defined based on existence of an independent reality and a stratified ontology. The stratified ontology encompasses three levels as; “Reality”, “Actuality” and “Empiricality” and it is comprised of structures, mechanisms, events, and experiences; emergent powers dependent upon but not reducible to lower-level powers; and an open systems perspective (Bhaskar 1975, 1986, 1998).

In the next section the above concepts will be explored in further which make the ontological aspect of CR more explicit.
4.4.2.1. Independent Reality

Critical realism is a branch of realism and indicates that the world and entities that constitute reality actually exist and it might be independent of human knowledge or our ability to perceive them (Bhaskar 1986).

CR states that the world cannot not simply be reduced to human perceptions and our experiences i.e. humans experience of the world or problems is only part of the reality which happens in the empirical domain and the nature of reality cannot be thoroughly perceived, and measured by human beings.

Bhaskar (1975) introduces two types of knowledge in defining reality in Critical Realism and those transitive and intransitive dimensions of knowledge. The entities which make the world are part of an intransitive dimension of knowledge and operate independently of humans and we may not be able to perceive it.

On the other hand, transitive dimension of knowledge are those entities and beliefs about their causal efficacy, which has been generated by reason and scientific research and it is constantly subject to change and re-interpretation.

In other words, Wynn & Williams (2012) argue that our beliefs or theories and developed concepts about the world and knowledge are ontologically real (and they are subjected to change and revision), however they are part of reality.

In order to explain this concept, CR introduces the stratified ontology (reality happens in various levels) which will be explained in the next section.

4.4.2.2. Stratified Ontology

Bhaskar (1975) explain the ontological dimension of reality in three different strata or as he explains it in three nested domain. Table 4.1. shows the stratification ontology of CR.
Real domain in stratified ontology is differentiated with other domains with mechanism. In other words, in real domain entities, structure and causal powers inherent to them as they independently exist. In the actual domain, events are emerged when the causal powers of structures and entities are enacted, regardless of whether or not these are observed by humans. In the empirical domain, people can observe, experience or measure the events and entities.

Bhaskar (1975) argues that, three domains are nested such that events in the domain of the actual that occur, because a mechanism is activated, are not necessarily perceived as experiences in the domain of the empirical. Likewise, there are mechanisms which exist in the domain of the real but that are not activated, or are activated but counteracted by other mechanisms, and thus do not produce events in the domain of the actual.

This stratified ontology is a key differentiating factor of CR with positivism and interpretivism in the ontological domain and is a key point to understanding the distinctive nature of critical realism.

Joseph (1998) argues that, in positivism, ontology is considered flat and reduces the reality to linear cause and effect (Humean Approach) and has little consideration for the various mechanisms in play.

On the other hand, Walsham (1995, 2006) argues that, ontology in interpretivism has less meaning and reality is constructed socially or
individually and it can only be understood through an analysis of agents’ meanings and actions and in extreme version of social constructionism reality does not exist independent of our (human) knowledge.

In contrast to ontological consideration of positivism and interpretivism, CR by categorising ontology to three nested domains, claims that, some elements of reality i.e. structures and mechanisms exist, but our knowledge of these elements is limited as we cannot access them directly.

Mingers (2004b) argues that, CR attempts to use current knowledge of the experiences in a given situation to analyse inferentially what the world must be like in terms of the structures and mechanisms that must constitute this reality for some accepted outcome to have occurred.

The implications of this view of reality are the foundations upon which CR-based epistemology and methodological practices are built. In the next section, various components of reality in ontological sense will be explored in further.

4.4.2.3. Structure

Danenrmark et al (2002) state that, in critical realism, structures would be defined as the “set of internally related objects or practices” that constitute the real entities we seek to investigate in a specific contextual situation.

The ontological value of these structures is that they have various features and tendencies that cannot be reduced to those of their component entities. Wynn & Williams (2012) argues that, the relationships among various entities in a structure, provide new properties that are distinct to the structure itself.

According to Fleetwood (2005), we are typically confronted in an IS context with a sociotechnical environment consisting of several interacting structures, each of which has the potential to impact the existing situation to generate the events.

Fleetwood (2005) argues that, this structure could be considered as a broader social structure which encompasses individuals, groups, set of routines and practices and technological artefacts in an organisation. In other words, an Enterprise System (ES) in use could be considered as a “Sociomaterial” in a web
of interrelations and discursive entities such as language and culture in an organisation.

Mingers (2006) argues that, social structures can both constrain and enable social activities, and are themselves reproduced or transformed by these activities. These social structures are not detached from the agents’ interpretations of their own activities which set within the structures. This does not imply that human agents have perfect knowledge of their actions or their consequences; only that agents must have some interpretation of the social structure in order to understand the meaning behind their own actions and those of other agents (Wynn & Williams 2012).

4.4.2.4. Mechanisms

Bhaskar (1975) considers mechanisms as “the ways of acting of things”. Bhaskar argues that, mechanisms are intrinsic to the physical and social structures and enable or constrain actions considering a given context (Sayer 2000, Smith 2006).

Mechanisms can be conceptualized as either causal powers or tendencies (Fleetwood 2004; Smith 2006). Causal powers are the “dispositions, capacities, and potentials to do certain things, but not others” (Fleetwood 2004, p. 46) that arise from the essential nature of the entities themselves.

Wynn & Williams (2012) state that, entities typically possess an ensemble of powers, which may or may not be enacted in a given context to generate the events manifest as empirical experiences. For instance, copper has the power to conduct electricity and this power is present in a piece of copper whether or not it is connected in an electrical circuit.

Tendencies go beyond powers to distinguish specific classes of things from others. Whereas powers designate possibilities, tendencies describe those actions which are characteristic or typical of a given class, species, or type of thing. As Bhaskar (1975) points out, “All men...possess the power to steal; kleptomaniacs possess the tendency to do so”.

The tendencies do not guarantee that a specific course of action would be occurred in law like pattern i.e. (cause and effect as in positivism), but as a
possible effect. Wynne & Williams (2012) argue that, the expected outcome of an enacted tendency may not result in an event in the actual domain as other mechanisms might be in play in a given structure that could prevent or alter the realization of a particular tendency. As such, “a tendency may never actually be realized” (Wynne & Williams 2012).

An actor’s beliefs or reasons that motivate intentional behaviours correspond to a tendency to act in certain ways (Bhaskar 1998). As a result, CR views an actor’s reasons as the generative mechanisms (i.e., powers) which are the cause of a given action (Archer 1995, Bhaskar 1998).

Each action may in turn trigger subsequent mechanisms on the part of other entities within the structure, leading to outcomes contrary to those expected or intended when the action was initiated. While reasons and beliefs may adequately explain a particular action, they do not necessarily determine its ultimate consequences.

Wynne & Williams (2012) state that causal mechanisms are not only attributed to human actors, for instance in IS contexts, which encompass various social structures and routines, Technological artefacts such as enterprise system applications, could be considered as the source of emergent powers that, along with actors’ beliefs, exert causal influence and may be appropriate to examine.

4.4.2.5. Events

Bhaskar (1975) considers event as a particular occurrence or an action which caused by the enactment of one or more mechanisms. Bhaskar argues that events are ontologically different from the structures and mechanisms that generate them. Gambetta (1998) asserts that, although the generated event which is the result of the enactment of causal powers or tendencies stemming from a structure, however it is possible that no change occurs because of the counteracting effects of one or more other mechanisms.

4.4.2.6. Experiences

As it can be seen in table 4.1., experiences are in the domain of empirical and are those events which we can directly observe, through our perception and or the instruments (enacting tools) we use to measure, assess or explore them.
Wynne & Williams (2012) argue that, this is aligned with the assumption of an independent and stratified reality, as CR affirms that experiences are only a subset of the actual events generated in a given context. It may be possible to experience events directly, for example, as part of laboratory experiments within closed systems, but this is the exception rather than the rule (Bhaskar 1975; Collier 1994).

Wynne & Williams (2012) argue that, scientists routinely assume the existence of certain structures based on their theoretical paradigms or the reliability on the used instrument before embarking on research on the area of concern designed to find direct observations to support their existence. Thus, our experiences may be flawed due to the used instrument and/or pre-assumptions about the outcome which attributed to the actual events that occurred.

Bhaskar (1975) argues that in CR, occurrences of the events within a given structure are ontologically independent of the experiences which we are capable of empirically observing and measuring them.

### 4.4.2.7. Emergence

Archer (1995) states that, in CR stratified ontology, although all domains are nested in each other however entities are independent from each other and also irreducible to the lower level components of which they are emerged.

The properties, capabilities, and powers that can be ascribed to a given entity or structure depend on not only those aggregated from the components, but also on the synergistic effects resulting from the pattern of their organisation. Thus, the properties of a given structure emerge from the interactions between the components themselves and their causal powers, but do not enable the structure to be defined simply by identifying the characteristics of the components.

“Explanation of why things social are so and not otherwise depends on an account of how the properties and powers of the ‘people’ causally intertwine” (Archer 1995), and not based on looking at the individuals in isolation (Easton 2010). It is also possible that mechanisms are identified as emerging from structural components at lower levels than the focus of analysis (Easton 2010).
4.4.2.8. Open Systems Perspective

Critical realism adopts a view of reality as an open system (Bhaskar 1998) that is beyond our ability to control the criteria of research directly. In other words, in majority of natural and physical sciences, experiments are being done under laboratory settings (closed systems) in order to control the contextual conditions and exogenous influences and to make the phenomenon visible by reducing confounding effects and to ensure a common environment for replicated investigations.

Bhaskar (1998) argues that, in laboratory settings experiments (closed systems); specific causes which generate an event or an outcome might not be recognised. Moreover, Social systems, such as socio-technical systems and or an enterprise system in use in an organisation, cannot be considered in laboratory settings or in closed systems.

Wynne & Williams (2012) state that, events are not only dependent on the causal powers available within a social structure, but also on the continuously changing contextual conditions and the evolving properties of components within the structure. Furthermore, the boundaries of social systems are not rigid and static but also fluid and permeable, i.e. mechanisms that were enacted in a given system and environmental context can generate totally different events in the future even in the same organisations.

Sayer (2000) also argues that, an important dimension in CR consideration is the element of “time” within open systems which is the differentiating factor of CR with structuration theory of Anthony Giddens.

4.4.3. Epistemology in Critical Realism

According to Chua (1986), an epistemological account is about acceptable truth by specifying the source, characteristics, and assessment of truth claims. In CR, epistemology is very close to ontology or as Wilson (2004) puts it, CR is bold in ontology and cautious in epistemology.

Wynne & Williams (2012) state that, in CR, epistemology is to describe reality based on an analysis of the experiences observed and interpreted by the participants and other types of data. The subsequent knowledge claims are
focused on specifying and describing those elements of reality. The nature and form of these knowledge claims are derived from specific epistemological assumptions linked to the ontological premises of CR. Wynne & Williams (2012) argue that, in CR, the goal of epistemology is to explain and understand the causal mechanisms in play rather than clear-cut prediction.

### 4.4.3.1. Explanation Rather than Prediction

The goal of a CR study is explanation of the mechanisms that generate a certain event, more so than the ability to make clear-cut predictions about future events or to understand the social/cultural meanings behind the events (Wynne & Williams 2012).

As Yin (2014) suggests, explanation stipulates the presumed factors to cause a given outcome. CR holds that one can rarely (if ever) identify a complete set of precedents (generative mechanisms) which will always lead to an outcome because of the possible interaction of mechanisms subsequently enacted by structural entities and contextual factors in an open system.

An open system view of the world includes the recognition that regularly occurring events within a complex setting such as a socio-technical system are the exception in reality because the effects of available mechanisms are seldom identical across multiple events and contexts. The lack of closure in complex social systems (e.g., organisations or socio-technical systems common in IS studies) makes it far more difficult to predict the events that result from a given initial event or change in structures (Wynne & Williams 2012).

However, CR, introduce the concept of demi-regularity which is a semi-predictable pattern or pathway of program functioning. A demiregularity, or demi-reg, is a partial event regularity indicating the occasional realization of a causal mechanism, with relatively enduring tendencies, in a bounded region of time and space (Lawson 1997).

Demi-regs can be leveraged with respect to explanation in two ways. First, we may look at a common phenomenon in similar contextual settings (e.g., the implementation of a particular enterprise system in different organisations that share important characteristics) not as a basis for prediction but to explore the existence and activation of a mechanism within each unique setting. Secondly,
we may identify fundamentally different outcomes in settings where structural, contextual, and environmental factors may lead us to expect some generally similar manifestations of mechanisms. These contrastive demi-regs offer the potential to fundamentally alter our understanding of a causal mechanism (Lawson 1997).

### 4.4.4. Methodology in Critical Realism

One of the main objectives of a research with CR lens; is to develop explanations for the ways things act and how they are capable of so doing. Ackroyd (2010) introduces various strategies including the identification of specific mechanisms, explanations of how mechanisms and context interact, and descriptions of the context within which mechanisms operate.

Wynne & Williams (2012) argue that, in information system research, 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.

While Bhaskar didn’t introduce any specific research method for CR-based research and empirical study in information system is still its infancy, however there have been novel studies with the focus on case study research strategy which the researcher can explore the context in further to identify the enacted mechanisms in play (Ackroyd 2010; Easton 2010; Strong & Volkoff 2010).

Table 4.2. shows, methodological principles in CR based research with the focus on context and case study research.
## Table 4-2: Methodological Consideration in CR

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<tr>
<td>Explication of Events</td>
<td>• Stratified ontology</td>
<td>• Thick description of case “story” including actions and outcomes</td>
<td>• Morton (2006) described a detailed sequence of five composite events associated with the strategic IS planning project.</td>
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<td></td>
<td>• Mediated knowledge</td>
<td>• An abstracted sequence of events (including the experiences of participants and observers)</td>
<td>• Volkoff et al. (2007) abstracted core events from empirical observations as changes to structure associated with an IS implementation.</td>
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<td></td>
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<td>• Description of the structural entities, constituent parts, and contextual conditions existing in the case</td>
<td>• Bygstad (2010) identified various elements of the information infrastructure, and the relationships among them.</td>
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<tr>
<td>Explication of Structure and Context</td>
<td>• Stratified ontology</td>
<td>• Identification of the relationships among the entities</td>
<td>• Morton (2006) identified organisation units and actors as primary structural entities, and described three structural relationships with causal implications for observed outcomes.</td>
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<td></td>
<td>• Open-systems perspective</td>
<td>• Explication of changes to the structure</td>
<td>• Volkoff et al. (2007) explored elements of structure, structure changes, and contextual influences by focusing on participant activities, responsibilities, and interactions.</td>
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<tr>
<td></td>
<td>• Mediated knowledge</td>
<td>• Description of the resulting emergent properties</td>
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</tr>
<tr>
<td>Retroduction</td>
<td>• Emergence</td>
<td>• Identification of a set of plausible candidate causal mechanisms</td>
<td>• Bygstad (2010) explained how the emergent higher level structures affect lower level entities and vice versa in identifying the innovation reinforcement and service reinforcement mechanisms.</td>
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<td></td>
<td>• Focus on explanation</td>
<td>• Logical and analytical support for the existence of proposed mechanisms</td>
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<td></td>
<td>• Explanation via mechanisms</td>
<td>• Linking the structure to events</td>
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<td>• Multiple explanations</td>
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<td>Empirical Corroboration</td>
<td>• Stratified reality</td>
<td>• Analytical validation of proposed mechanism based on case data</td>
<td>• Volkoff et al. (2007) and Morton (2006) demonstrated causal efficacy by using the hypothesized mechanisms to explain other events occurring in the cases.</td>
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<td></td>
<td>• Unobservability of mechanisms</td>
<td>• Assessment of explanatory power of each mechanism relative to alternative explanations</td>
<td>• Bygstad (2010) discussed a comparative analysis of candidate mechanisms to determine which offered the strongest explanatory power.</td>
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<td></td>
<td>• Multiple explanations</td>
<td>• Selection of the mechanism(s) that offers the best explanation</td>
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<tr>
<td>Triangulation &amp; Multimethods</td>
<td>• Independent reality</td>
<td>• Multiple theoretical perspectives</td>
<td>• Zachariadis et al. (2010) integrated a series of studies based on interview data, econometric analysis, survey data, and historical analysis.</td>
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<td></td>
<td>• Mediated knowledge</td>
<td>• Multiple analytical and methodological techniques</td>
<td>• Volkoff et al. (2007) utilized multiple data sources, data types, and investigators.</td>
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<tr>
<td></td>
<td>• Unobservability of mechanisms</td>
<td>• Variety of data sources and types</td>
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<tr>
<td></td>
<td>• Multiple explanations</td>
<td>• Multiple investigators</td>
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Source: Wynne and Williams (2012)
4.4.5. Justification of Adopting Critical Realism for this Research

This research is studying the process of change considering the materiality aspect of technology which is developed by enterprise system vendors and system designers. In this regard, this study is exploring, the process of change from critical realism approach in terms of broader philosophical underpinning and theoretical framework which has been constructed and critically evaluated in chapter three.

The philosophical approach of critical realism in studying the process of change and in information system research in particular has been received attention in top IS journals and various scholars explore this issue (Dobson 2001; Mingers 2004a, 2004b; Smith 2006, Volkoff et al. 2007, Strong & Volkoff 2010, Mutch 2010, Bygstad 2010, Wynne & Williams 2012 Volkoff & Strong 2013).

As it has been explored in terms of the methodological lens, critical realism bridges positivism and interpretivism by carefully distinguishing between its ontology and its epistemology (Strong & Volkoff 2010).

From the ontological perspective, critical realism is aligned with positivism in a way that CR considers; objects, entities and structures have an objective, independent existence. On the other hand, CR considers epistemology as like interpretivism, that human knowledge of these items is socially and historically constructed (Mingers 2004a). However, as it was explored earlier, the ontology in CR is considered in different and nested layers (Bhaskar 1998). While these entities and objects are “real” our observations of these objects and entities are necessarily subjective (Bhaskar 1998).

According to Strong & Volkoff (2010), causality is not deterministic as in institutional theory which was explored in literature gap, however real entities are assumed to have causal effects. In other words, material aspect of technology (entities in CR vocabulary) on their own and/or in combination with other rules and routines causes/generates effects through generative mechanisms. Some of these changes/effects can be empirically tested and observed.
This is consistent with CR approach towards change as Archer (1995) argues, the entities (materiality) are existed before the process of change (events). However, events/changes might lead to subsequent transformation in the materiality/technology (entities).

These two definition of critical realism i.e. the stratified ontology and the horizontal stratification i.e. materiality of enterprise system (entities) exists before the change process fit well with the methodological approach for this research. This has been supported by novel studies which the theoretical framework of this research has been developed (Strong & Volkoff 2010, Volkoff & Strong 2013).

It is explored in theoretical framework chapter (Chapter 3) that CR is referred to meta-theory and acts as an explanatory process theory. In this regard the objective is not prediction and/or what change will happen, nor describing what did happen but also, identifying the mechanisms that cause/generate the observed phenomena in the empirical domain.

Archer (1995) from a sociological dimension of structure and agency argues that, these mechanisms by which pre-existing structural conditions shape agency, and in turn the mechanisms by which agency changes or reinforces these structural conditions. This is in consistent with structuration theory of Giddens (1984), however structuration theory disregards technology in its theoretical consideration.

It is argued in theoretical framework chapter that Enterprise System (ES) is labelled as a material aspect (entities) which plays an important role in the change process and consistent with real domain of stratification and it is located in the “Real” domain. This materiality is conceptualised as influencing the ostensive aspect of the Routines (Structural Aspect) in the actual domain and also the Performative aspect of the Routines (Agency) in the Empirical level.

In this regard, ES is considered as a source of structural conditioning of routines (ostensive part) and also agentive aspect of routines (performative dimension) in the empirical domain at the moment of instantiation or technology in use.
Critical realist lens has been adopted as it can reveal the interplay between ostensive aspect of routine and performative aspect, by examining the generative mechanisms.

The next section of the methodology will explore various consideration and justification of the research approach for this research in further.

4.5. Research Approach

According to Saunders et al (2016), the extent that a researcher is clear about the theory and the logic of analysis and form of inquiry at the beginning of the research raises an important question concerning the design of the research.

The approach towards mode of reasoning and inquiry are mainly categorised as deductive which dates back to Descartes Philosophy and reasoning inquiry [1637] (1921) and inductive approaches (see Kuhn 1970) which mainly correspond to positivist and interpretivist research paradigms respectively.

Saunders et al (2016) argue that, a theory that a research adopts might be clear at the beginning of the research for instance in time series and regression models in quantitative approach, or it may not be explicit at the beginning (for instance use of grounded theory in qualitative approach). However, theory will be explicit and clear at the end of the research and in the presentation of the findings and conclusions.

Ketokivi & Mantere (2010) state that, in deductive reasoning, the conclusion is derived logically from a set of premises and assumptions i.e. the conclusion being true when all the premises are true. In deductive approach, researchers develop some hypothesis based on constructed theory and with deductive reasoning, the theory would be tested by testing the sets of hypothesis and premises.

In contrast in inductive approach, reasoning will be conducted by justifying the conclusion which is supported by observations rather than hypothesis and affirming the theory (Ketokivi & Mantere 2010). In inductive approach, the data will be collected and then a theory will be constructed as a result of the data analysis (Saunders et al 2016).
Saunders et al (2016) state that, deductive reasoning often associated with positivism and quantitative approach respectively and inductive approach often associated with interpretivism and qualitative method, however such labelling might be misleading and research should take a cautious approach in terms of reasoning and mode of analysis in the research design.

It can be considered another distinct form of reasoning that is called abductive approach, which begins with observations and “surprising facts” on the conclusion. In this process, various sets of theories and premises would accommodate or determine the conclusion (Saunders et al (2016).

Van Maanen et al (2007) note that, some plausible theories can account for what is observed better than others and it is these theories that will help to uncover more ‘surprising facts’. Van Maanen et al (2007) also stress that deduction and induction complement abduction as logics for testing plausible theories.

4.5.1. Importance of Research Approach

Easterby-Smith et al (2008) emphasise on the importance of the research approach for several reasons. Research approach enables the researcher to take a more informed decision about the research design, which is more than just the techniques by which data are collected and procedures by which they are analysed.

It is the overall configuration of a piece of research involving questions about what kind of evidence is gathered and from where, and how such evidence is interpreted in order to provide good answers to the initial research question. Research approach also, enables the researcher to think about those research strategies and methodological choice that will work for and those that will not. For instance, if the research is more concerned about why something is happening rather than what is happening; then inductive reasoning would be more appropriate.

Finally, Easterby-Smith et al (2008) argue that, knowledge of the different research traditions enables researchers to be more pragmatic in terms of the research limitations. For instance, these could be practical consideration, from access to data, or lack of prior knowledge of the subject. In other words, it may
not be possible to frame the research and hypothesis due to lack of data and the researcher might not have sufficient understanding of the topic.

Brief overviews of these three approaches in terms of the use of theories are as follows;

4.5.2. Deductive Reasoning as Theory Testing

According to Ketokivi & Mantere (2010), deduction occurs when the conclusion would derive rationally from set of assumptions and the conclusion makes sense if the propositions hold. The propositions and premises could be in the form of theory and through hypothesis testing between those premises and variables, the conclusion can make sense.

Collis & Hussey (2003) argue that, deductive reasoning is associated with scientific inquiry that involves the development of a theory that is subjected to a rigorous test. Deductive reasoning is the dominant approach in the natural sciences, where laws present the basis of explanation, allow the anticipation of phenomena, predict their occurrence and therefore permit them to be controlled (Saunders et al 2016).

4.5.3. Inductive Reasoning as Theory Building

According to Ketokivi & Mantere (2010), in inductive reasoning, the objective of the researcher would be to get a feel of what is going on, so as to understand better the nature of the problem. Therefore the process of the research is aligned with qualitative approach and the focus is on making sense of the interview data. The outcome of the data analysis is the formulation of a new theory.

4.5.4. Abductive Reasoning

Suddaby (2006) states that, if the research starts by collecting data to explore a phenomenon and explain patterns, either to generate or modify an existing theory which can subsequently be confirmed through additional data collection, the abductive approach would be adopted. In other words, instead of moving from theory to data (as in deduction) or data to theory (as in induction), an abductive approach moves back and forth, in effect of combining deduction and
induction (Suddaby 2006). Table 4.3 shows three research approaches in terms of reasoning.

### Table 4-3: Deduction, induction and abduction: from reason to research

<table>
<thead>
<tr>
<th></th>
<th>Deduction</th>
<th>Induction</th>
<th>Abduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Logic</strong></td>
<td>In a deductive inference, when the premises are true, the conclusion must also be true</td>
<td>In an inductive inference, known premises are used to generate untested conclusions</td>
<td>In an abductive inference, known premises are used to generate testable conclusions</td>
</tr>
<tr>
<td><strong>Generalisability</strong></td>
<td>Generalising from the general to the specific</td>
<td>Generalising from the specific to the general</td>
<td>Generalising from the interactions between the specific and the general</td>
</tr>
<tr>
<td><strong>Use of data</strong></td>
<td>Data collection is used to evaluate propositions or hypotheses related to an existing theory</td>
<td>Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework</td>
<td>Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth</td>
</tr>
<tr>
<td><strong>Theory</strong></td>
<td>Theory falsification or verification</td>
<td>Theory generation and building</td>
<td>Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory</td>
</tr>
</tbody>
</table>

*Source: Saunders et al (2016)*

#### 4.5.4.1. Retroduction

Critical Realism defends abduction, or in CR literature, 'retroduction' as first coined by “Charles Sanders Pierce” (Aymin 1974) as its form of inquiry. As Suddaby (2006) puts it, “instead of moving from theory to data (as in deduction) or data to theory (as in induction) a retroductive approach moves back and forth from theory to data and data to theory in effect of combining deduction and induction”. According to Buchler (1955) & Perice (1957), the essence of retroduction is identifying what reality must be like (Stratified Ontology of CR) or what mechanisms are in play, that generate the observed event to have occurred.

Retroduction in CR is also aligned with Wittgenstein's view of reasoning as our observation about reality being theory-laden and that our mode of inference in research could be complemented by a back and forth process between theory and data. As Wittgenstein (1958) puts it about meaning and language,
“When I think in language, there aren’t ‘meanings’ going through my mind in addition to the verbal expressions: the language is itself the vehicle of thought” p. 107.

According to Wynne & Williams (2012), in CR, retrod uction could be defined as first conceptualising mechanisms in play as causal powers or tendencies and link them to the capacities which are intrinsic to the structural components (in actual domain) and seek the relationship to specific occurrences.

Retrod uction is the core principle of CR explanatory model and philosophically it is derived from the ontological assumption of emergence (in the stratified ontology) and the epistemological focus on explanation. Causal mechanisms (generative mechanisms, tendencies), are the basis of the explanation.

However due to open system perspective of CR, there could be potential for multiple accounts of knowledge as various causal mechanisms might not be observed in the empirical domain.

Wynne & Williams (2012) cite from Bhaskr (1975) states that, if there are existing mechanisms in the theoretical knowledge of a field, they are adapted to fit the specifics of the given case. However, if no existing mechanisms are adequate to explain the phenomena being studied, a new mechanism (or set of mechanisms) is proposed.

In the research context, and aligned with the nature of the research questions and unit of analysis, the resulting set of mechanisms may include the reasons and beliefs held by individual actors.

Groff (2004) argues that, the mechanisms in play could be identified by analysing the actions performed by individual actors, as well as the actors stated or inferred reasons for doing so. As Bhaskar (1998) argues; an understanding of a given action will depend upon an explanation of the interpreted beliefs that each actor held regarding a given situation.

Furthermore, Mingers (2006) argues that, this does not prove that stated beliefs are accepted and/or objectively true as the actors may not have a complete and undistorted view of reality or a clear understanding of their own beliefs. The differences between the expected and actual outcomes may be
useful to highlight the degree to which these beliefs may be out of phase with the real nature of the structures in which the actions occur.

Wynne & Williams (2012) state that, retroduction is a creative process to some extent, as in terms of empirical research, multiple explanations might be proposed which address causal mechanisms set within a social structure, that must exist in order to produce the observed events.

In this regard as Weick (1989) suggests that, the researcher might need to have “thought trials” to identify and describe the elements of the causal mechanism and the contextual influences responsible for its activation.

Retroduction can be effectively done in an iterative process during data collection and analysis involving corroborating interviews, high-order coding, process tracing, and process modelling (Wynne & Williams 2012).

Bygstad (2010) in “how the information infrastructure is generating innovation, and how the innovations are modifying the information infrastructure” study, identifies macro-micro and micro-macro mechanisms to explain innovation and new services reinforcement mechanism. Bygstad points to the possibility that alternative explanations may exist, such as a market mechanism or entrepreneurial drive.

4.6. Research method

Myers & Avison (2002) state that, research methods are means of acquiring and developing knowledge within a discipline. Harvey & Myers (1995) argue that, research method needs to be relevant to the field and area of concern and that rigour of the research need to be justified within a particular field.

Within social science, research methods can be categorised distinctly as quantitative and qualitative method (Saunders et al 2016). However mixed-method approach as a third choice has been receiving attention in social science disciplines due to its pragmatic and creative process (Creswell 2013).

In the followings, various research methods in IS in particular which is considered as the main context of this research, will be explored in further.
4.6.1. Quantitative and Qualitative Research Method

According to Creswell (2013), quantitative research method is defined as validating and testing objective theories by exploring the relationship between the variables in the model. This process usually is being done by statistical modelling, time series and regression as instruments of the research and therefore the focus is on quantitative data and numbers.

Myers & Avison (2002) state that, quantitative method was developed in social sciences to study natural phenomena and thus the focus would be on numbers and mathematical modelling. In this regard, quantitative method is considered as strong scientific evidence in a research context where numbers and objectives truth play important roles.

Saunders et al (2016) state that, quantitative research and qualitative research can be differentiated by distinguishing between numeric data (numbers) and non-numeric data (words, images, video clips and other similar material). Quantitative research method is often considered as a synonym for any data collection technique (such as a questionnaire) or data analysis procedure (such as graphs or statistics) that generates or uses numerical data. Whereas qualitative method is often used as a synonym for any data collection technique (such as an interview) or data analysis procedure (such as categorising data) that generates or uses non-numerical data.

In terms of research design qualitative method is mostly associated with interpretivist research philosophy, as researchers need to make sense of subjective and socially constructed meanings about the questions being studied (Denzin & Lincoln 2005). Some elements in the research context are important in terms of justification for the research, for instance, establishing trust between interviewees and interviewers in order to access to meaning and in-depth understanding in qualitative research method (Denzin & Lincoln 2005).

4.6.2. Justification of Qualitative Research

Understanding how technical artefacts are created and used to enable organisations to change their existing routines and structures for further competitiveness is a central aspect of the IS research discipline (Braa & Vidgen...
The conduct of research in technology and social organising is thus a major issue for the IS community.

According to Braa & Vidgen (1999), IS development is historically contingent, socially situated, and politically loaded and therefore needs to be grounded in theories of social action. It is important to have a holistic research method with strong underpinning philosophies in researching “Enterprise System” in order to explore the change process. As mentioned in the literature review of this research “Enterprise System” is considered as a technology artefact where human i.e. social agents, play an important role in the implementation and process of change. Research in this field should consider both element i.e. technology and human at the same time, with a constitutive entanglement approach or as Orlikowski (2007) puts it, “sociomaterial assemblage”.

Technology of ES cannot be considered as a discrete object/entity and out of context. Technology of ES does have meaning/interpretation both from systems designers, ES architects, and implementing organisations and it might be fundamentally different in various organisations. In this regard, it is important to explore these meanings from various perspectives i.e. various system developers/designers (social agents). This approach sharply contradicts with quantitative approach which the focus is on data and in extreme examples, context is disregarded completely.

In this sense, qualitative research method, underpinned by critical realist philosophy, could be the well-balanced methodological lens for this research for the following reasons;

The role of the researcher is to find out the change process with a theory that considers the intermingle of social actors and technology (Sociomateriality). Thus, the focus on numbers and objective theories and disregard of the socially constructed meaning of change by ES designers/developers would not lead to effective analysis.

Critical Realism with Retroduction approach can be cautious on epistemology and bold on ontology (Wilson 2004). In other words, all interpretation and socially constructed meanings of change by interviewees should be cautiously
considered and need to be validated in a back and forth process of interviews/data and conceptual framework.

The following section will explore the implementation of research or research strategies in general in social science and “Narrative Inquiry” as adopted and justified strategy for this research.

4.7. Research Strategy

Strategy is defined as a plan of action to achieve an objective or the final goal. In a research context, a research strategy could be explained as a plan of action on how a researcher will find out explicit answers of the research question (Saunders et al 2016).

In more details and in methodological vocabulary, a research strategy is the pragmatic link between the philosophy of the research and subsequent choice of methods (quantitative, qualitative and/or mixed-method) towards data collection and analysis (Denzin & Lincoln 2005).

Several research strategies can be conducted in social science disciplines with varying choices from quantitative towards qualitative as a single method and/or mixed-method as a combination of both (Creswell 2013). The following research strategies are considered as most recognised strategies in social science research which can be conducted via quantitative or qualitative or mixed-method approach.

- Experiment;
- Survey;
- Archival Research;
- Case Study;
- Ethnography;
- Action Research;
- Grounded Theory;
- Narrative Inquiry

The important focus is on the justification of the research strategy and how this strategy communicates with other components of the research and the broader philosophical underpinnings (Saunders et al 2016).
Due to the nature of this research, which has been conducted with a CR lens and qualitative research method, various research strategies which are popular in qualitative research studies will be explored further.

### 4.7.1. Action Research

Action research is recognised as one of the fundamental research strategies via qualitative lens due to its close link with practice (Baskerville & Wood-Harper 1998).

According to Myers (2013), the objective of action research is to solve practical problems, hence contributing and enhancing scientific knowledge. In this regard, the context of the problems and dilemmas is one of the fundamental components which an action researcher is involved throughout the whole process of research.

Action research is typically an iterative and collaborative research process and focuses on the learning of the participants in the research i.e. action researcher and other subjects within the context of the subjects’ social system (Myer 2013).

Baskerville & Wood-Harper (1998) argue that, action research is concerned with organisational change and understanding the problem situation through organisational processes with the focus on learning, iteration and feedback loops.

### 4.7.2. Case Study

Case study is one of the most popular research strategies in social science research and it can be adopted in various ways. According to Yin (2014), a case study as a research strategy is an empirical inquiry which explores a phenomenon within its real-life context.

Myer (2013) argues that, case study in business schools can be approached in two ways; teaching & in research. In teaching, case study helps students to better understand theories which are relevant with business context. Case study with teaching approach, highlights that theory has practical application and brings life (make it relevant) to the subject matter.
Myer (2013) argues that, the main audiences of “research case studies” are researchers and not students. As the objective of research case studies is to make an empirical ground for the study and researchers attempt to convince other researchers, in terms of the applicability and inapplicability of the used theories and frameworks in their research.

However, case study as a research strategy can be seen from other dimensions. For instance, Braa & Vidgen (1999), categorised case study with regard to wider philosophical paradigms of positivism and interpretivism to “Hard Case Study” and “Soft Case Study”. In this categorisation, “Hard Case Study” mainly corresponds to positivist paradigm where the researchers work with hard, technical and objective and generalised facts. Whereas in “Soft Case Studies” which are mainly associated with interpretivist paradigm; researchers are mainly concerned with subjective concepts that are highly intertwined with the context of the study. Braa & Vidgen (1999) argue that, generalisation to other contexts is not the main objectives of “Soft Case Studies” but also an understanding from the researchers’ perspective.

Braa & Vidgen (1999) position various research strategies (soft case study, hard case study and action research) in a framework (Figure 4.2) with regard to the objective of the research as understanding, prediction and change.

![Figure 4-2: Research Strategy Location with regard to Research Objectives](Image)
4.7.3. Grounded Theory

Grounded theory is considered as one of the main qualitative research strategies, that aims to produce a novel theory from systematically gathering and analysing data (Myers 2013). As a research approach, grounded theory follows an inductive approach and the research strategy is considered as “theory discovery methodology” (Martin & Turner 1986).

Myers (2013) argues that, the main difference between grounded theory research strategy and other qualitative research method is the continuous and dynamic interaction between data collection and analysis. Grounded theory is regarded as a methodology which develops context-based and process oriented theories which potentially explain organisational phenomena with well-balanced descriptions or as Corbin & Strauss (2007) put it, a “Unified Theoretical Explanation”.

Creswell (2013) argues that, grounded theory in contrast with other qualitative research strategies, does not come “off the shelf”, but also is developed and created from grounded data from participants who actually experience and observe the process.

4.7.4. Ethnography

Ethnography is also considered as one of the main qualitative research strategies which aims to define and explore subjective concepts within a society; for instance, an “entire culture sharing group”. Myers (2013) regards ethnographic study as one of the most in-depth research methods.

Creswell (2013) argues that, an ethnography study is a type of qualitative research design in which the researcher aims to describe and interpret the shared and also learnt patterns of values like beliefs, language etc. among a specific culture and context. Creswell (2013) argues that, ethnographic study usually involves a larger sample than other qualitative research strategies and in this regard, it usually demands a longitudinal fieldwork.
According to Myers (2013), in the context of business and management studies, ethnographic field study should be considered as a choice if the researcher aims to study organisational culture and phenomena. Myers (2013) argues that, organisational culture incorporates various implicit and tacit components or as he puts it “taken for granted” assumptions which are practically impossible to discover for researchers in a short period of time.

The following section will firstly explore “Narrative Inquiry” as a single research strategy of this study and secondly will justify this strategy with other components of the research methodology.

4.7.5. Narrative Inquiry

A narrative is a story or personal account which interprets an event or sequence of action. The majority of qualitative research interviews inevitably involves participants in storytelling and the term ‘narrative’ could be considered as interpreting the data to analyse the data (Czarniawska 2008).

Narrative inquiry as a research strategy has a more specific meaning and purpose. According to Saunders et al (2016), in some research contexts where the researcher believes that, the experiences of the participants can best be accessed by collecting and analysing these as complete stories, rather than collecting them as bits of data that flow from specific interview questions.

According to Musson (2004), narrative inquiry allows the researcher to analyse the linkages, relationships and socially constructed explanations that occur naturally within narrative accounts in order ‘to understand the complex processes which people use in making sense of their organisational realities’.

Saunders et al (2016) argue that, the ways in which events in a story are linked, the actions that follow and their implications are more likely to be revealed by encouraging participants to narrate their experiences rather than by responding to a series of pre-defined questions. Narrative inquiry seeks to connect the chronological order of events as told by the narrator (participant) experiences, to enhance understanding and aid analysis.
Chase (2005) discusses that narrative as a research strategy, contributes to connecting events and actions over time into a construct and to a ‘meaningful whole’.

The depth of this process is also likely to produce ‘thick descriptions’ of contextual detail and social relations which illustrate factors, such as financial, cultural, managerial or capability ones, that facilitate or constrain the context being researched (e.g. Chase 2005; Musson 2004).

Gabriel & Griffiths (2004) argue that, adopting narrative strategy allows researchers to ‘gain access to deeper organisational realities, closely linked to their members’ experiences’.

In Narrative inquiry, the participant is the narrator, with the researcher adopting the role of a listener, facilitating the process of narration. Chase (2005) explores narrative inquiry as a research strategy in the business and management discipline and specifically study of organisational change processes.

Saunders et al (2016) argue that, although the majority of data collection in narrative strategy would be in-depth interviews to collect stories and personal accounts about a subject or context, other methods may be used such as participant observation (Gabriel & Griffiths 2004) in the research setting.

Chase (2005) argues that, narrative inquiry may be conducted with a very small number of participants (one, two or three), who are selected because they are judged as being typical of a much larger culture-sharing population.

Musson (2004) also supports in-depth narrative interviews with a small sample of company founders or entrepreneurs in specific contexts (critical or extreme cases) may prove to be valuable.

According to Gabriel & Griffiths (2004), narrative strategy is generally conducted with small and purposive samples and is likely to generate large amounts of data in the form of interview transcripts or observational notes.

Moreover Coffey & Atkinson (1996), affirm the connection of interview data to previous research to outline the structural elements that are useful to facilitate
analysis of narratives. To achieve such analytical coherence, a narrative account may involve the narrative researcher in (re)constructing the story from the strands that emerge from conducting a number of in-depth interviews with one participant or with different participants.

The purpose of Narrative inquiry is to derive theoretical explanations from narrative accounts whilst maintaining their integrity. Whilst analysis in Narrative inquiry does not use the analytical fragmentation of “Grounded Theory”, neither does it offer a well-developed set of analytical procedures comparable to those used by grounded theorists. Despite this, analytical rigour is still important in order to derive constructs and concepts to develop theoretical explanations. Whilst narrative researchers may believe that predefined analytical procedures are neither advisable nor desirable, this may make the task of analysis more demanding.

4.7.6. Justification of Narrative Inquiry for this research

Van de Ven & Poole (2005) argue that, process studies derive theory from data and observation as it was stated in inductive reasoning, however there are researches that test hypothesised models of change (deductive reasoning) therefor the research method employs a mixture of approaches.

It can also be argued that in most process studies of change, abductive reasoning or in CR term retroduction (Peirce 1955), could be used as according to Poole et al (2000), who recognises that in retroduction, theories would be adopted to guide researcher’s observation and in this process, can develop/revise and complement theories.

In this study, organisation routine theory (Feldman & Pentland 2003) as a unit of analysis to study change (Mohr 1982) has been used in order to see the process and nature of change. However, Feldman & Pentland (2003) do not consider the influence of technology or material aspect of technology i.e. Enterprise Systems in organisational routine theory. It is suggested to complement the theory and add further dimensions to organisational routine theory namely material dimension to organisational routine components (Volkoff et al 2007, Strong & Volkoff 2010, Volkoff & Strong 2013) and relational concept towards affordances (Stoffregen 2003) which were discussed
in the theoretical framework chapter in order to capture the reality of organisational change considering enterprise system technology.

Tsoukas & Hatch (2001) also argue that, field studies of organisational change are often conducted for developing and/or revising a process theory of change. Tsoukas & Hatch (2001) indicate that, a process theory needs to go beyond a surface description of change and needs to penetrate the logic behind observed temporal progressions.

Tsoukas (1989) argues that thick explanations of change need to identify the generative mechanisms that cause observed change to happen in the real world, which is consistent with the methodological consideration for this research (Harre & Madden 1975).

Czarniawska (1998) argues that, in order to explain process theory, researchers need to shift the focus from description to explanation, which requires a story and a plot. Furthermore, Czarniawska (1998) states that narrative theory is the story in an abstract conceptual model in which generative mechanisms are identified. Pentland (1999) states that in process theory of change the story or the narrative should have the following features;

- **Sequence in time.** Chronology is a central organizing device. The events or actions referred to in a narrative are understood to happen in a sequence.
- **Focal actor or actors.** Narratives are always about someone or something
- **Identifiable narrative voice.** There should always be an identifiable voice doing the narrating which reflects a specific point of view (Rimmon-Kenan 1983).
- ‘Canonical’ or evaluative frame of reference. Narratives carry meaning and cultural value because they encode, implicitly or explicitly, standards against which actions of the characters can be judged.
- **Other indicators of content or context.** Narrative texts typically contain more than just the bare events. In particular, they contain variety of concepts attributes of the context. These indicators do not advance the
plot, but they provide information that may be essential to the interpretation of the events.

4.8. Data Collection & Analysis Consideration

4.8.1. Narrative Data Analysis

This research is exploring the influence of technology and in particular enterprise systems in organisational change. In this regard it was suggested and justified to consider the material aspect of technology in detail. In other words, people who design enterprise systems are considered as the main source of data and information for this research.

The field work of this research which will be explored in further detail in chapter 5, will focus on enterprise system vendors and system design. In particular, Enterprise Architects, Enterprise Systems Designers, Chief Information Officers (CIOs), Business Development officers and Enterprise System Consultants, have been considered to have the primary source of information and data due to their holistic understanding on the details of Enterprise System and in practice they design, offer and develop enterprise systems to organisations.

Semi-Structured interview has been considered to guide the interview process as this approach to data collection could provide valuable insight (Yin 2003) into the research topic. Samples of Interview questions and transcribed data can be found in the Appendix D & F.

Narrative analysis has been used for analysing data, the procedures and details of which can be explored in Chapter Five. De Fina & Georgakopoulou (2008) highlight the significance of a conventional approach to narrative data analysis which focuses on analysing narratives according to their structural elements.

According to De Fina & Georgakopoulou (2008), narrating with the focus of structural elements can be categorised into two main strands as follows;

- A temporal sequence – or the order in which events occurred.
- Logical sequence.
De Fina & Georgakopoulou (2008) argue that, in order to analyse narratives as complete accounts, researchers can colour-code different structural elements. These elements may include the defining situation, key issue, action and outcomes. This approach permits the researchers to identify different analytical themes without fragmenting the narratives.

Conventional approach in narrative data analysis, allows the researcher to compare and contrast different narrative accounts relating to the same situation more easily as reading and rereading each one. Reading and rereading transcripts of narrative accounts several times is recognised as being an important aid to their analysis (De Fina & Georgakopoulou 2008).

De Fina & Georgakopoulou (2008) also indicate to conventional approach as an appropriate data analysis tool with an ‘an active teller, highly tellable account, relatively detached from surrounding talk and activity, linear temporal and causal organisation, and certain, constant moral stance’ but may not be suitable for other narratives that do not conform to these characteristics.

Mello (2002) indicates to a range of approaches for narrative data analysis with the focus not only on narrative structural elements but also on other features of their content. These features might arise when analysing the text/narrative to identify patterns and themes that occur across the narratives of different participants. Mello (2002) states that the results following this approach, lead to credible and dependable findings.

Mello (2002) argues that, it is highly useful to compare related parts of different narratives to understand contrasting perspectives between informants. The views from several narratives may be more insightful than using the view from only one. Mello (2002) also believes that findings will be more credible where multiple approaches are used to analyse narratives.

In order to demonstrate analytical rigour, researchers need to explain the approach they use with great care and justify this in relation to the context of the research and research questions and objectives, and chosen research strategy (Saunders et al 2016).
4.9. Validity and Reliability

4.9.1. Empirical Corroboration

Validity of the data and the research using a Critical Realist approach is called empirical corroboration. According to Wynne & Williams (2012), identifying alternative theoretical explanations in the form of causal mechanisms is the essence of empirical corroboration in a research which is being done through a critical realism lens.

Wynne & Williams (2012) argue that, empirical corroboration logic is based on observing further data i.e. in this case further interviews to ensure that the proposed mechanisms adequately represent reality (in this case the process theory of change by ES), and have both sufficient causal depth and better explanatory power than alternative explanations.

The Empirical corroboration principle is derived from the ontological assumptions of an independent reality and a stratified ontology, and the epistemology of unobservability of mechanisms and multiple potential explanations (Wynne & Williams 2012).

Corroboration is necessary to overcome the fragility of retroduction inference by attempting to validate the existence of the proposed mechanisms. Wynne & Williams (2012) argue that, the descriptions of causal mechanisms identified through retroduction are transitive dimension of knowledge about the real domain, which is comprised of those things that may not be directly observed but that must exist to explain observed events.

Bhaskar (2012) argues that, CR is the philosophy of “Underlabourer”. The objective of underlabourer concept in Bhaskar terms is, illuminating and empowering “Human Emancipation”.

Bhaskar (1975) states that “it is the job of substantive science to discover which mechanisms actually exists”. In this regard underlabourer can be aligned with an empirical corroboration concept in a sense that science needs to explore various alternative ways of explanation and causal mechanism which make sense in stratified ontology through time.
Wynne & Williams (2012) argue that, corroboration will be impacted by value-aware perceptions of researchers and participants operating within various social structures and the influences of existing theoretical lenses.

According to Lee & Hubona (2009), the main idea is that, proposed mechanisms “must survive an empirical test, where survival is indicated by the observation of evidence consistent with what the theory predicts”.

4.10. Summary of the Chapter

This chapter has provided step by step information accompanied with a comprehensive justification regarding the methodology used to conduct this research. This research has been conducted under the Critical Realism philosophical lens which has increased attention in IS/IT field studies in the recent years.

Furthermore, the justification of qualitative research method and narrative inquiry has been explored and justified for this research. The next chapter will provide detailed information regarding the process of implementation of the research which has been conducted with narrative inquiry as a solid research strategy.
5. Chapter Five - Fieldwork – Narrative Inquiry and Data Analysis

“The best way to predict the future is to design it”

Buckminster Fuller (1895 – 1983)

5.0. Introduction

The contents of this chapter fall into eight sections. In the first section, narrative inquiry as a single research strategy for this research will be explored, justified and critically evaluated in further. Role of narratives in organisational studies, various features of narratives approach towards research and structural elements of narrative approach are the subsections of section one of chapter five. In the second section of chapter five, the context of the narrative will be explored in further depth. In this section, various concepts and literature, such as enterprise and information system complexity, Enterprise System (ES) design as a socio-technical system (STS) design, off-the-shelf enterprise system applications, Business Process Reengineering (BPR) and ES best practices, will be evaluated in further. In the third section of chapter five, narrative inquiry process will be explored in further. Section three of this chapter falls into four sub-sections. Narrative approach towards stability and change, chosen narrative based on the wider research components, the story teller, and the narrative plot which narrates the change process through the conceptual theoretical framework.

Section four of the chapter five will engage with the main narrative plot. Section five of this chapter will explore the structural elements of the narrative plot. Section six of this chapter will explore the interview process and section seven describes narrative data analysis. Narrative data analysis will be explored in section seven of this chapter with the sub-sections of data transcription and making sense of interview data aligned with the narrative plot.
The summary of the chapter and the link to Chapter Six will be presented at the end of this chapter.

5.1. Narrative Inquiry as the Research Strategy

Narrative inquiry, in terms of a single research strategy for exploring the process of change, has been justified for this research in the methodology chapter. It is important to follow coherent and plausible steps in terms of the implementation of the research aligned with the principle of the narrative inquiry supported by citation in the literature of the process theory of change through narrative inquiry.

According to Wagner (2003), narrative inquiry is recognised by scholars in the fields of cognitive psychology, organisation theory, and information systems. Wagner (2003) indicates that adopting a narrative research strategy by qualitative researchers can provide multiple insights about IS/IT mediated change initiatives. By adopting a narrative research strategy at all stages of the empirical work, researchers are better equipped to see the interconnectivity of stories and to follow the change process as it unfolds.

It was mentioned in the methodology chapter that narrative approach plays a fundamental role in humanities and social sciences (Bakhtin 1981; Greimas 1987; Propp 1968; Ricoeur 1983).

5.1.2. Role of Narrative in Organisational Studies Research

Vaara et al (2016) argue that, narrative approaches have become increasingly popular in management and organization studies, something that reflects both their utility and versatility. In management and organisational studies narrative approaches, can be considered in range of topics that span macro research such as strategy (Barry & Elmes 1997), meso research such as change (Boje 1991; Brown & Humphreys 2003; Sonenshein 2010) and micro work such as personal growth (Maitlis 2009; Sonenshein et al 2013). Above-mentioned scholars have used different aspects of narratives in their research.

Vaara et al (2016) provide an overall definition towards narrative as; temporal, discursive constructions that provide a means for individual, social, and organizational sense-making and sense-giving. They argue that while narrative
analysis has typically focused on relatively coherent narratives that have a clear beginning and an end, however organizational narratives are often articulated only in fragments as a part of organizational discourses.

Vaara et al (2016) also argue that, narratives are mobilized in various kinds of ways. For instance; intentional storytelling (Boje 2008), but narratives are also used and reproduced in many other ways as part of discourses and communication.

With the particular focus on this research, i.e. “change and stability” Vaara et al (2016), highlight the crucial role of narrative in research process and point to recent studies (e.g. Dailey & Browning 2014; Farjoun 2010; Feldman 2000). Furthermore, Vaara et al (2016) argue that narratives provide an essential means for maintaining or reproducing stability and/or promoting or resisting change in and around organizations.

In terms of implementation of research, or research strategy, using a narrative perspective in organization studies often the challenge arises as, “where do I start?” and “which approach do I use?” The epistemological and methodological pluralism provides for a rich body of research but also comes with critical challenges. Furthermore, there is a need to develop comprehension of specific approaches to narratives with their fundamentally different onto-epistemological assumptions and methodological preferences (Vaara et al 2016).

In order to define organizational narratives in further; six key features of organisational narratives cited from Vaara et al (2016) will be explored in the followings.

5.1.3. Six Features of Organisational Narratives

Firstly, organizational narratives are temporal, discursive constructions that provide a means for individual, social and organizational sense-making and sense-giving (Vaara et al 2016). Organisational narratives thus often associated with other language-based perspectives such as organizational discourse (Phillips & Oswic, 2012), rhetoric (Cheney et al 2004) sense-making (Maitlis & Christianson 2014) framing (Cornelissen & Werner 2014) or vocabularies
(Loewenstein et al 2012) without addressing what makes narratives a unique form of discourse.

Secondly, organizational narratives are not often fully fledged stories or accounts as classical narrative research in literary theory or linguistics assume (Boje 1991, 2008). The temporal plotlines are not always explicit and can remain implicit in organizational narratives. (Vaara et al 2016) argue that this is partly due to the fact that organizational communication is often complex, ambiguous and fluid. Thus, Vaara et al (2016) state that narrative analysis in management and organization studies must also comprise fragmented narratives where elements of narrative structures such as the end or the beginning are implicit.

Thirdly, Vaara et al (2016) argue that a narrative view requires a focus on the means by which they are produced and consumed. The terms narrative, account, and story are often used interchangeably. In other words, stories as existing narratives that can be told and retold in various forms. Accounts are people’s own narrative descriptions of organizational processes, events, and phenomena. Narration and storytelling are also key terms in narrative analysis. Narration is the process in which narratives are told, whereas storytelling is the activity that spreads various kinds of stories in and around organizations (Boje 2008, 2014).

Fourthly, although we focus on organizational narratives, we emphasize that they are parts of multifaceted structures. At the macro level, researchers have linked organizational narratives with broader societal narratives that reproduce dominant values and ideologies (Lyotard 1979).

Fifthly, Vaara et al (2016) state that although narratives in organization studies are usually associated with language (written or spoken), however they can also include and relate to other forms of communication and modes (especially visual and audio).

Sixthly, narratives play a key function in terms of stability and change in organizations. At one level, people’s accounts or researchers’ narratives provide descriptions of sequences of events, which frame these events as change or stability. At another level, organizational narratives can also be influential in
organizational processes, thereby changing the trajectory of events that unfold, which in turn may change the organization or reproduce the status quo (Vaara et al 2016). The important point here is that, narratives have performative power (i.e. narratives are constitutive acts) and agency (i.e. narratives may bring about change in organizations) (Vaara et al 2016).

5.1.4. Structural Elements of Narrative

According to Czarniawska (1998), in order to explore the process theory of change, a focusing on explanation and exploration rather than just a mere description of what is happening, a “plot” or “story” should be adopted. This plot should have an active “Identifiable Voice” which is doing the narration, and reflect specific point of view based on the wider research components (Rimmon-Kenan 1983).

Pentland (1999) argues that, this plot or story should be about someone or something (“Enterprise Systems Enabled Organisational Change” as investigated in this research) which should be set in the plot in terms of content of the research. Moreover, due to the qualitative nature of this research which has been explored in the methodology chapter, it is justified that a well-balanced approach towards data collection could be from the people who design the technology and enterprise system applications with interview approach. Yin (2014) argues that interviews in qualitative research provide valuable information and insight about the context and enable the researcher with a rich understanding of the content of the research. Interview technique usually is categorised as Structured, Semi-Structured and Unstructured techniques towards data collection (Yin 2014).

Semi-Structured interviews from enterprise system industry experts/professionals, is considered as a main source of data collection for this research due to the following reasons.

There exists a knowledge gap between industry and academia (Frisk et al 2014) and people of each domain are not familiar with the terminology and concepts regularly used in the other domain. In the context of this research, organisations and professionals who the interviews have been conducted with are not generally familiar or they have different interpretations of various
concepts used in this research namely, “Organisational Routines” (Ostensive, Performative), “Affordances”, and “Technology Enable Change” etc. In this regard, structured interviews with sets of closed ended questions (based on the strict research questions) might not reveal the rich insight towards the interplay of organisational routines.

On the other hand, unstructured interviews usually would be conducted when the researcher does not have appropriate knowledge of the research topic and context. Researchers in unstructured interviews mainly are trying to explore to identify very generic themes in the topic (Yin 2104) and as Myers (2013) puts it, the key idea in narrative unstructured interview is to let the interviewee narrate freely. Whereas in this research, interviews would be based on the context of the narrative (plot), which is designed and justified for this research.

The interview context has specific fluid boundaries aligned with the objectives of the research and research questions and conceptual framework. The role of the researcher (myself) has been leading the interviews towards the objectives of the research and my task has been to make sense of the interview data aligned with the constructed conceptual theoretical framework.

5.2. Setting the Context

In this section of the fieldwork, important elements which contribute to the process of change by ES application in organisations will be explored in further.

5.2.1. Enterprise/ Information System Complexity

Enterprise systems are designed for managing an organisation’s business processes throughout the entire organisation in order to reach optimum process efficiency and the organisation business effectiveness throughout the supply chain. By definition, ES applications as discussed in the first part of the literature review are important and are considered as an inseparable part of any contemporary organisation, from large multi-national firms towards small and medium enterprises (SMEs).

Complexity is one of the fundamental issues in IS/IT in general and particularly Enterprise System (ES) applications in various stages, from design to adoption and implementation. Complexity can arise in various stages (i.e. design of an
It can be argued that the complex nature of dilemmas and problems in contemporary organisations, demands a more holistic enterprise system application which can capture the reality of the problems in further. This argument highlights the significance of a well-balanced approach in design stage which can address the complexity of organisations’ dilemmas and problems and is aligned with the rapid pace of change in contemporary organisations.

Table 5.1. shows the main studies on type of complexity in organisations and technology and system literature.

**Table 5-1: Description of Complexity in various Literatures**

<table>
<thead>
<tr>
<th>Types</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Organisational complexity** | Business processes, communication and networking (Benbya and McKelvey, 2006)  
Number of and relationship between hierarchical levels, formal organisational units and specialisation (Baccarini, 1996)  
The complexity of organisational environments surrounding the project (Xia and Lee, 2005) |
| **Technological complexity** | System specification, design and implementation – user requirement and translation into software (Benbya and McKelvey, 2006)  
Number of and relationship between, input, output, task and technologies (Baccarini, 1996)  
A composite measure of diversity of technologies, database intensity and system integration effort (Meyer and Curley, 1991)  
The complexity of technological environment of the ISDP (Xia and Lee, 2005) |
| **System complexity** | Uncertainty and ambiguity that surround practice of information system project which are originated from the developer's environment (McKeen et al., 1994)  
The difficulty in determining the information requirements of the system, the complexity of processing and the overall complexity of the design (Tait and Vessey, 1988) |

According to Ciller (1998), complexity by definitions involves various dimensions. For instance, heterogeneity in the context of information system (Merali 2006; Hanseth & Lytten 2010), diverse agents and entities that interact in a dynamic and non-linear way (Hanseth & Lytten 2010, Schoenherr et al. 2010).
The notion of information system as a complex system is a popular concept within IS research (Desai 2005; Benbya & McKelvey 2006; Merali 2006; Mukherjee 2008; Hanseth & Lyttinen 2010).

An “Enterprise Information System Design” also is a complex project and each component is still being researched in terms of their complexity, for instance Information (Kallinikos 2006), System, Design and Architecture (Perrow 1984).

A further point would be that any IS development, such as Enterprise Systems (ES), involves various stakeholders. In this context, complexity stems from communication, coordination and accommodating every stakeholders demand and/or managing stakeholders demand which could be quite difficult as every stakeholder might have differing sets of goals (Kirsch 1996).

Various research explores the stakeholder issue to enhance IS scholars understanding of complexity of IS. For instance, in system theory (Mukherjee 2008), contingency theory (Geraldi 2009) and Socio-Technical-Systems theory (Schoenherr et al. 2010) which all consider the stakeholder dimension in information system design.

In this regard, it is important to explore the process of design and architecture of ES applications in further.

5.2.2. Enterprise System Design

According to Mumford (1995), computer system design is associated with problem solving philosophy and has been developing structurally from 1950s onwards. The technical approach towards designing a system has been accepted by the majority of system designers uncritically. It is called the technical approach by various scholars as computer systems are considered as solving problems which are defined in technical terms.

Design process is initiated by breaking down the processes into its smallest parts and explores which of these parts are essential to the problem-solving function and reassembling of these parts to the logic of computer systems (Mumford 1995). The current system would incorporate a more rigorous set of controls than the legacy system, and assures that the system work more
efficiently in terms of speed and accuracy. Mumford (1995) regards this approach as underpinned by the engineering discipline as a technical-rational approach which is expecting the human being to conform to the demands of the machine.

In this approach, managers are considered as those who can best conform to the technology (computer systems) demand by enhancing system efficiency through staff reduction (machine displace human) and tighter financial and operational controls. With this technical-rational approach, there would be further control and monitoring on the remaining staff in order to meet the end needs of technology i.e. highest efficiency through minimum staff (Mumford 2006).

However, reality proves that, highest efficiency through technology and consequently technical rational approaches would not be possible and does not necessarily change the system to an optimum and effective state due to stakeholder resistance to the new system. The argument is based on social aspects of the system; as Mumford (2006) argues, people have values, attitudes and psychological needs and a neglect of these values can throw a change situation into a state of disequilibrium. This means that instead of changing the legacy system towards the new technical system (and hence further efficiency), the new system operates more inefficiently than was expected and the cost of innovation might not pay off.

The root of this technical approach as discussed above is in engineering philosophy, which assumes that by following a technical analytical approach towards system design, the stakeholders and social sides will adapt to their requirement of the technical side. However, this system design has been challenged by the fact that human beings cannot work at the pace and efficiency of machines and technology unless work systems and processes are completely automated.

Although many of the work processes can be done by the machine, it is still is the duality of man-machine systems and in this research “Enterprise Systems – Organisations”. In this regard, it is important to explore the system design which considers the role and contribution of social side and in this context an organisation.
Mumford (1995) argues that, if the mutual dependency of man-machine is unrecognized and only the machine part of the system is consciously designed then the system is unlikely to function effectively.

The next section Socio-Technical System Design” will be explored in further in order to highlight the role of enterprise system designers/architects.

5.2.2.1. Socio-Technical System Design

Mumford (1995) argues that, a great volume of information in designing a social-technical system comes from the systems analysts who are positioned in the design group. It is suggested that for organisations to reorganise their working systems by various best practices and/or business process reengineering (BPR) projects, outsider technical system should not be allowed to dominate the organisations.

Mumford (2006) argues that, when a new system is being implemented, usually a technical system is put in place first. Once this has been done, administrative and organisational changes are made to fit the demands and constraints of the new technology. This could be an unsatisfactory strategy and as it has been discussed above, the social side needs to fulfil the demand of technical side and/or technology.

The socio-technical approach endeavours to optimize both the use of technology and the need of organisational and human input. According to Mumford (1995), the principle of a socio-technical system (STS) is to make work more satisfying for the person doing it, while at the same time enabling this person to contribute, to a high level of technical efficiency.

According to Mumford (2006), some of the basic principles of Socio-Technical System (STS) are as follows:

- Compatibility; the process of design must be compatible with its objectives.
- Minimal Critical Specification; No more jobs should be specified than is absolutely essential.
- The Socio-technical Criterion; Variances, defined as deviations from expected norms and standards, if they cannot be eliminated, must be controlled as close to their point of origin as possible.
- The Multi-functionality Principle; Work needs a redundancy of functions for adaptability and learning.
- Boundary Location; Boundaries should facilitate the sharing of knowledge and experience. They should occur where there is a natural discontinuity – time, technology change, etc. – in the work process.
- Information must go, in the first instance, to the place where it is needed for action.
- Support Congruence; Systems of social support, must be designed to reinforce the desired social behaviour.
- Design and Human Values; High quality work requires
  - jobs to be reasonably demanding;
  - opportunities to learn;
  - an area of decision-making;
  - social support;
  - the opportunity to relate work to social life;
  - a job that leads to a desirable future

Usually in practice of designing a Socio-Technical System, it is suggested not to separate technical systems and human systems (social side), but also to think through socio-technical alternatives. Figure 5.1, shows a very basic Socio-technical approach towards designing a system.

![The Socio-technical approach](image)

**Figure 5-1: Schematic of Socio-Technical Approach towards Design**
According to Bell & Wood-Harper (2003), in designing an information system application like an Enterprise System (ES), the role of a system analyst is to facilitate the design by helping the end users to clarify their information processing requirements in order to design the most appropriate system to meet these requirements.

In the case of designing an ES application, the role of system analyst and system designers, either from within the organisations and/or from ES vendor, is highly important. According to Bell & Wood-Harper (2003), the system analyst has to perform a detailed analysis of the working system with other stakeholders in the organisation in order to develop a working socio-technical system (STS).

The initial analysis of the system is the hardest step as every organisation could be unique on its own. As Bell & Wood-Harper (2003) put it; the reality of the organisations is complex and messy. Furthermore, enterprise system analysts might have some pre-assumptions which can be shaped with some technical approach towards system design and might not be able to grasp the essence of the targeted organisational system.

The role of system analyst is like the role of an enterprise architect which creates/architects designs to the client’s specification, or for their approval, which can then be implemented by adopted organisations. Although this view could potentially minimize the significance of the role of end users in the analysis and design process (Bell & Wood-Harper 2003).

**Requirement Analysis**

Organisations might vary in terms of their requirements; however, it could be considered that some generic needs in the majority of organisations can pose as similar requirements. According to Alpers et al (2014), the analysis of organisation requirements is driven by the organisation’s wider strategy. Alpers et al (2014) indicate to three categories associated with requirements by organisations that adopting enterprise system applications as;

- Functional requirements
Functional Requirements

Alpers et al (2014) identify six categories of functional requirement which could be common for any enterprise systems as follows;

- General Requirements
- Human Resources Management (HRM)
- Data Processing and Management
- Sales / Marketing / CRM
- Controlling
- Industry Sector Specific Category; sub categories e.g.:
  - Production
  - Services
  - Trading

External Regulations

External regulations can be defined as legal restrictions, company compliance rules as well as operations or business strategy. Alpers et al (2014) state that, these criteria usually ought to be met by the new enterprise system. Typical requirements in terms of external regulations might be as follows;

- Interface & dialogues in the company’s main language
- User support in this language
- Service support administrators
- Clients fully compatible with a certain environment (e.g. an operation system or a browser engine)
- On-premise installation
- Privacy and protection of employee data
- Data may not leave the company
- No data access for employees of the system vendor
- Redundant system operation and automated backups (according a certain policy)
- The system; the systems maintenance agreement has to be priced below a certain amount

Interfaces

There are some typical interfaces in the context of ERP systems, such as interfaces to:
• HRM Systems (including pay role system etc.)
• Wiki Systems
• Document Management
• Office and Groupware Systems
• Telephone System

5.2.2.3. Enterprise System Vendors

Enterprise system market is a very competitive (Brehm et al 2006) and is hence a lucrative market (Rashid et al 2002, Nikookar et al 2010). The main area of business of Enterprise System Vendors is designing the application and in terms of business development, selling the products to various businesses and organisations. One of the main products of ES vendors are the ERP packages either in the form of off-the shelf applications (needs minimal customisations), or in the form of “Best Practices”, “Industry Solutions” and “Product Solution”.

Table 5.2. shows the top 10 Enterprise Systems Vendors based on their ERP applications in terms of their recent development and revenue generation from 2014 to 2015 through subscription business model.
### Table 5-2: ES vendors in 2015 and their ERP market shares in 2015

<table>
<thead>
<tr>
<th>Rank</th>
<th>Vendor</th>
<th>2014 ERP Apps Revenues, $M</th>
<th>2015 ERP Apps Revenues, $M</th>
<th>YoY Growth</th>
<th>2015 ERP Market Share, %</th>
<th>Recent Developments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SAP</td>
<td>Subscribe</td>
<td>Subscribe</td>
<td>23%</td>
<td>6%</td>
<td>The number of customers for SAP S/4HANA, its next-generation ERP suite, has exceeded 3,700 by July 2016, up from 3,200 three months earlier.</td>
</tr>
<tr>
<td>2</td>
<td>FIS Global</td>
<td>Subscribe</td>
<td>Subscribe</td>
<td>-2%</td>
<td>4%</td>
<td>Acquired SunGard Data Systems in late 2015 for its complementary range of products and services in Capital Markets, Wealth and Asset Management, and Risk Management to financial institutions and businesses worldwide.</td>
</tr>
<tr>
<td>3</td>
<td>Oracle</td>
<td>Subscribe</td>
<td>Subscribe</td>
<td>3%</td>
<td>3%</td>
<td>Oracle’s ERP, EPM, &amp; SCM Cloud business has over 2,600 customers.</td>
</tr>
<tr>
<td>4</td>
<td>Fiserv</td>
<td>Subscribe</td>
<td>Subscribe</td>
<td>3%</td>
<td>3%</td>
<td>Core banking, eCommerce sales remain its key focus.</td>
</tr>
<tr>
<td>5</td>
<td>Intuit Inc.</td>
<td>Subscribe</td>
<td>Subscribe</td>
<td>3%</td>
<td>2%</td>
<td>Converted QuickBooks customers to subscription-only model.</td>
</tr>
<tr>
<td>6</td>
<td>Cerner Corporation</td>
<td>Subscribe</td>
<td>Subscribe</td>
<td>38%</td>
<td>2%</td>
<td>Acquired Siemens Medical for ERP systems for healthcare providers in 2015.</td>
</tr>
<tr>
<td>7</td>
<td>Microsoft</td>
<td>Subscribe</td>
<td>Subscribe</td>
<td>-5%</td>
<td>2%</td>
<td>In 2016 Microsoft is boosting its ERP offerings by pairing Dynamics AX with Cortana Intelligence Suite for big data analytics and Power BI for visualization and enhanced reporting.</td>
</tr>
<tr>
<td>8</td>
<td>Ericsson</td>
<td>Subscribe</td>
<td>Subscribe</td>
<td>17%</td>
<td>2%</td>
<td>Consolidated gains in OSS and BSS apps, while steering telcos to 5G.</td>
</tr>
<tr>
<td>9</td>
<td>Infor</td>
<td>Subscribe</td>
<td>Subscribe</td>
<td>-0.1%</td>
<td>2%</td>
<td>In July 2016, Infor acquired Starmount for converged commerce, adding cross-channel selling to Infor CloudSuite Retail.</td>
</tr>
<tr>
<td>10</td>
<td>McKesson</td>
<td>Subscribe</td>
<td>Subscribe</td>
<td>-4%</td>
<td>2%</td>
<td>Sold off its practice management apps to e-MDs in 2016.</td>
</tr>
</tbody>
</table>

*Source: Apps Run The World, June 2016*
5.2.3. Off the Shelf Enterprise Systems

In the IS literature, there is a difference between off-the-shelf enterprise systems and custom-built software packages. According to Brehm et al (2001), ERP packages in industry terms are often considered as off-the-shelf packages, as organisations implement them by configuring the key organisational elements rather than traditional programming. In other words, the key elements of organisational needs and activity models have been set up in advance for the off-shelf packages. The organisational needs might be shared in some certain industries for instance oil and gas, the retail sector, banking and insurance.

Modification to the ERP applications in terms of changes to the software and codes are usually intensely discouraged by the vendors and implementation consultants, due to the enormous resources (time, human resources, cost of modification) involved.

However, the majority of organisations need to modify the adopted ERP applications in order to meet the fast pace of changing organisational needs (Bashein et al. 1997, Markus & Tanis 2000, Soh et al. 2000). This could potentially highlight the role of enterprise architects and enterprise system designers which need to monitor the changing nature of the complex business environments and need to align the enterprise system applications accordingly.

One of the most important features of enterprise system applications is that they are in fact packages that are designed, programmed and developed by independent enterprise system vendors for selling to organisations that adopt and implement them. Markus & Tanis (2000) state that, enterprise system applications are designed to meet the general needs of a class of organisations, for instance, in industry level, rather than the unique requirements and needs of a specific organisation. By adopting generic or off-the-shelf packages through “Vanilla Implementation” (Brehm et al 2001), organisations can significantly reduce the costs & risks associated with custom built enterprise systems. Organisations which adopt and implement off-the shelf ERP packages are sure to have on-going and smooth support services from Enterprise System vendors.
Laudon & Laudon (2000) argue that, enterprise systems do not neatly fit in, the traditional distinction between “custom-built” application and “off-the-shelf” application due to number of reasons. Firstly, the scope of current ERP packages is much broader than traditional software packages or that of early software packages which affect just some small part of organisations, for instance, a software package just for an accounting department or a manufacturing department. Secondly, current enterprise system applications are designed for dealing with more flexibility in the way a company operates than traditional enterprise systems applications i.e. in traditional packages, business processes were “hard coded;” and consequently resulted in inflexibility (Brehm et al 2001).

Contemporary enterprise system packages usually need some tailoring in order to fit the need of the adopting organisation. However, the extent of the tailoring can vary from organisation to organisation and from industry to industry based on various factors. Brehm et al (2001) argue that, one of these factors is the degree of fit between the enterprise system features and the business processes of adopting organisations. The earliest versions of enterprise systems like SAP R/3, ERP applications were designed for “generic” needs of organisations.

Brehm et al (2001) argue that, the earliest enterprise systems were designed for the manufacturing sector, and consequently these enterprise system applications resulted in a relatively low degree of fit between package and organisational features. As in manufacturing sector, business processes might vary significantly with banking and insurance and as a result a great deal of effort is required to make an appropriate configuration and fit between ES application and an organisation business processes.

According to “SAP SE” (the biggest enterprise system vendor), most of the ES packages today come in different industry- specific “flavours,” and as a result in many cases there need to be fewer configurations as most of the organisations in the same sector share similar business processes. However, there are numerous companies under the umbrella of SAP and other enterprise system vendors which design and programme unique and specific adds-on to the main ES package. For instance, Vistex Inc., is one of the major SAP partners which respond to various organisation specific needs in various industries. This adds-
on feature is compatible with the main ES applications which are called “bolt-on” packages in academic terms.

According to Brehm et al (2001), “Bolt-ons” are extensive modifications of a basic ES package developed and designed by a third-party independent software vendor (under license agreements with the original vendor) to meet the needs of a particular customer segment.

Another factor which triggers the amount of tailoring is the organisation’s willingness to adapt its business processes to the ES package is when the two sides differ. In this regard, it is important to consider the extent that an organisation is willing to reengineer their business processes in order to align with the ES application.

In the next section, Business Process Reengineering (BPR) will be explored to understand the relationship between an ES vendor and an organisation in further, which can potentially lead to effective socio-technical system (STS) design.

5.2.4. BPR and ES Applications

Business Process Reengineering (BPR) as a term was first coined by Michael Hammer in HBR article in 1990 and received attention in academic circles, partially in ES and technology adoption and implementation. BPR is the analysis and redesign of processes within and between enterprises in order to gain maximum process efficiency and automate non-value-added tasks (Hammer 1990).

Hammer (1990) argues that, redesign and reorganisation of an enterprise processes is the essence of process efficiency to lower costs and enhances productivity through IS/IT, which is a key enabler of radical change.

In ES application design and adoption by organisations, BPR is a key and an important concept as effective ES adoption in organisations would be accompanied with re-engineering and re-designs of the processes. According to Subramoniam et al (2009), BPR can be defined as the transformation from function based systems to process based systems.
Business Process Re-engineering (BPR) is considered as the fundamental rethinking of business processes to achieve significant improvement through efficiency and effectiveness i.e. cost reduction, quality enhancement and service and speed improvement.

According to Davenport & Short (1998), ES implementation should take place in an alignment with BPR or as they put it; ES is considered as an enabler of BPR in organisations. ES and BPR have a recursive relationship which means improvement in one of them results in improvement in the other.

According to Subramoniam et al (2009), some issues could complicate the BPR in companies which are in the process of implementing an ERP application such as:

- Comparative cost analysis of various ways of doing a process leads to changing the best practice in one company,
- Multiple legacy systems,
- Unique and different regulations among companies and various industries,

From a strategic point of view, BPR could be considered as an important tool that can bridge the strategic gap in organisations by reducing the knowledge gap. A strategic gap is defined as the gap between the elements of what firm can do & what firm must do. The knowledge gap is also defined as the gap between what firms must know & what firms know (Subramoniam et al 2009).

Figure 5.2 shows these gaps which could be reduced by BPR systems in organisation.
This gap in implementing an ES application is considered as the gap between an organisation's requirements and the proposed ES. According to O’Leary (2000), in a study conducted by Forrester research, there could be four situations in terms of business process reengineering in companies which intend to implement an ES application as follows:

- Select an ES which fits the business processes and needs little customisation (as discussed above off-the shelf packages like, SAP R/3 ERP application)
- Customise the ES which could fit the business processes (tailoring a generic ES)
- Re-engineer business processes in order to fit the ES
- No existing policy
O’Leary (2000) introduced a framework in ES adoption and implementation in companies based on the level of organisational process re-engineering and ES software change. There are two extreme domains in this framework i.e. small "r" and big "R" which can be seen in figure 5.3.

![Figure 5-3: Extend of BPR in organisations](source: Subramoniam (2009))

There are advantages and disadvantages associated with each of these situations and there is no superiority between choosing one solution. Many organisational factors would determine which approach should be considered and which should not.

**Small "r" Minimal Organisational Process Change & Minimal ERP Software Change**

Mostly SMEs (Small and Medium Enterprises) would go for this option as they cannot afford large investments in customising the ERP package and also changing the existing business processes is significantly costly. The advantage of small "r" is that, it is quicker and cheaper in comparison with other options as it does not encompass major changes both in ERP application and business processes. The disadvantage behind this situation could be that, in small "r", as the business and organisational processes do not change, so the number of staffs is not changing too. Therefore, one of the major objectives of ERP systems would not be satisfied i.e. cost reduction by displacement of an ERP system and staff.
Extensive Process Change and Minimal Software Change

In this approach business processes in the organisation are changed extensively based on the ES features. This option may be considered as an opportunity for companies to change to the best practices in industry by adopting the on the shelf ERP packages. This option could be taken by the firms which envision that changing people and also business processes are much easier and cost effective than changing the ERP software. In this situation, it is much easier for companies to update the ERP software to newer versions.

Minimal Process Change & Extensive Software Change

Unique organisational processes such as unique value chain would lead organisations to choose this option. It suits large organisations with enough financial resources to support the customisation of ERP software based on their business processes.

Big "R" Re-engineering Extensive Organisation Process Change & Extensive Software Change

This option suits cutting-edge companies with high level of market power. According to Subramoniam et al (2009), Boeing is one of the good examples during the re-engineering process while implementing Baan (ERP software). It is considered as one of the best options not only for big companies but also for the ERP vendors as they could achieve a unique solution as a new product. The advantages in this option are;

- The company would be the first one which enjoys the benefits of the new ES.
- ES vendors and partners contribute to the cost and risk of implementation as they could get a new product while implementation.

The disadvantage associated with this approach could be regarded as expensiveness for the end product and also for updating to newer versions.

5.2.5. Enterprise System Best Practices

The ground for best practice is based on the idea that there are certain practices and solutions which are superior in comparison with others when solving problems in a certain context (Axelsson et al 2011).
Best practice building blocks have been present from the early years of 20\textsuperscript{th} century and from the Taylorism and Fordism era (Taylor, 1911) in terms of efficient processes which has been shaped first in the manufacturing sector.

According to Axelsson et al (2011), best practices has been adopted in the IS/IT sector with the term “best business practice” which implies that leading businesses, formulate a standardized work system and embed it into efficient IS/IT systems like an (ES) Enterprise System application. The objective can be considered as; the best and effective way of dealing with a problem or handle an issue which should be copied and transferred to the organisations that implement Enterprise Systems.


Organisations, by using such experiences and knowledge as best practices can be confident in the well-balanced quality in their results and outcomes and having consistency in their actions (Stephenson & Bandara 2007).

Best practices should not be misunderstood as inflexible working routines and strict and steady practices. Best practices can be considered as a philosophical approach towards working routines in terms of continuous learning and improvement which is realized by continuous assessment of the organisation and updating of processes based on the current situation (Axelsson et al 2011).

ES best practices can be considered as a competitive advantage for the ES vendor (Wagner & Newell 2004), as ES best practices can be used as a powerful argument for ES business development sector in terms of marketing their product.

Axelsson et al (2011) state that, an ES best practice from the ES vendor perspective is supposed to be used in as many organisations and industries as possible. The argument would be justified as adopting and implementing a specific ES as a best practice, for instance SAP R/3 or an ES inventory management application, can help the ES vendors to identify the bugs and
problems in the adopted organisations and revise early versions with adds-on features during time.

However there exist contrasting arguments in terms of adopting unique ES applications for many industries and organisations. For instance, organisations adopt and implement ES applications to enable them to realise their competitive advantage (Porter, 1998; Pisano & Teece 2007), and the argument is, if an ES best practice as business solution fits into all organisations and industries, there exists little room for unique organisation’s competitive advantage or specific industries’ competitive advantage.

Gratton & Ghoshal (2005) state that, organisations need more than best practice to stay competitive. They indicate to “unique signature processes” to the context of each organisation and combined with ES best practices can keep organisations in the market and hence competitive, and differentiate them from others.

Axelsson et al (2011) indicate that, best practices in this competitive context can be defined as various generic standardized practices that are generally accessible, while organisations also need to put their own input on their processes in order to differentiate from their competitors.

5.3. Narrative Inquiry Process

The wider philosophical underpinning of this research as discussed in length in methodology chapter is considered with critical realism lens. Narrative approach as the research design is traditionally associated with interpretivist approach in terms of philosophical underpinning of the research, as the researcher attempts to explore the reality (in an epistemological sense) within a group of actors or social settings.

In order to justify the narrative approach in this study which has been developed based on the main principles of CR, the author explores various types of narratives considering wider philosophical lens of the research on organisational change and stability. Vaara et al (2016) categorised narrative approaches on stability and change in organisational studies to three main strands as; Interpretative, Realist & Poststructuralist.
In this regard in the following section narrative approach towards various philosophical approaches to research will be explored in further. Realist approach and poststructuralist approach as the closest approaches to critical realism will be critically evaluated and will be explored in length in the following section.

5.3.1. Narrative Approaches to Stability and Change

According to Vaara et al (2016), three distinctive approaches to organizational narratives can be considered as realist, interpretative, and poststructuralist approaches. The main features of each approach in terms of method, source of theory and contribution to stability and change are summarized in Table 5.3. However in this study, some elements of realist and poststructuralist approaches will be combined, as CR is a form realist philosophy in a critical stance and in terms of epistemology close to poststructuralist approach.

5.3.1.1. Interpretative Approaches: Narrative Constructions as Objects of Study

Narratives in interpretative approaches are conceptualized as people’s constructions of organizational phenomena (Vaara et al 2016). Narrative study from interpretivist approaches is highly associated with social construction approach and has played a central role in organizational narrative analysis as it has developed into a distinctive research area (Czarniawska 1997, 2004; Gabriel 2000).

Interpretative narrative analyses tend to draw from literary studies such as Greimasian structural analysis of narratives (Greimas 1987) or social psychology such as Bruner’s (1986) work on the central role of narratives in social cognition. In organization and management studies, narratives are frequently associated with sense-making (Weick 1979; Maitlis & Christianson 2014) as an overall theoretical framework. Vaara et al (2016) argue that, narratives in interpretative approach come into two primary forms as individual narratives and composite narratives. As the chosen narrative approach for this study is not considered as interpretative approach, so the details on definition and process of individual and composite narratives can be
The next section, narratives from realist approach will be explored in further detail.

**5.3.1.2. Realist Approaches: Narratives as Representations or Data**

According to Vaara et al (2016), in realist approach, narratives are a means to study things that exist independently of the narratives themselves. In this regard, narratives resonate with realist or positivist understandings of organizational phenomena where narratives per se are not in the focus of the analysis but are seen as representations of other phenomena.

Vaara et al (2016) argue that, narrative from realist perspective can be categorised as “Narrative Representation” or as “Narrative Data”.

**Narrative representations**

Narrative as representations focuses on the researcher’s construction of the case at hand, and the term narrative alongside similar ones such as “tale” are used to describe the researcher’s construction of the case (Vaara et al 2016). Narrative as representation can be seen in process studies of change, in which narratives play a central role in understanding stability and change (Pentland 1999; Van de Ven & Huber 1990).

**Narratives as data**

According to Vaara et al (2016), Narratives can be used as sources of data to access phenomena that exist independently of the narratives in question. This is consistent with wider realist philosophical approach, as the reality in realism can exist independent of us in an ontological sense.

The range of studies on “Narrative as Data” varies from the casual use of the term narrative to refer to interview data to using narratives as a basis of capturing experiences or socio-psychological processes. Thus, organization scholars have drawn from different sources, including structured positivist methods to use narrative data (e.g. Abbott 1992) or selective application of the
methods of “Narrative Inquiry” originating from the work of Polkinghorne (1988).

More recent studies have frequently used narratives as a critical component to explain some type of change relevant outcome. For instance, Sonenshein (2006) explores issue crafting, that is, how individuals shape the meaning of issues by language use, by using narratives as data. Sonenshein captured change agents’ narratives to influence others about a change by having working professionals write a memo to either a boss, direct report or co-worker. Sonenshein compared these public narratives with a private narrative subjects had written beforehand.

In another study, Sonenshein & Dholakia (2012) collected employees’ narratives of organizational change, and then related these narratives to change behaviours which were mediated by psychological resources.

In both approaches in realist narratives i.e. narrative as representation and narrative as data, the researcher attempts to explore organisational phenomena by mapping interview data to the broader framework and organisational processes. In other words, narratives are considered as researchers’ constructions of organizational processes. In an epistemological sense narratives in realist approach are considered as sources of data to capture organizational and managerial phenomena.

5.3.1.3. Poststructuralist Approaches: Narrative Deconstruction and Narrative Emergence

Narrative approach towards research also can be drawn from poststructuralism, frequently with critical stance (Vaara et al 2016). A number of poststructuralist influences can be found in streams of narrative organization studies (e.g. Boje 2014).

Vaara et al (2016) argue that, interpretative studies focus on the description and elaboration on narratives that play a central role in the social construction of organizational reality, whereas poststructuralist studies objective is on uncovering the complexity, fragmentation and fluidity of narrative representations. Vaara et al (2016) point to two kinds of poststructuralist studies as; narrative deconstruction that aims to problematize prevailing or
dominant narratives, and narrative emergence that seeks to uncover the central role of emerging narratives in organizational processes. These two types of poststructuralist narratives will be briefly discussed in the following section.

**Narrative Deconstruction**

Critically oriented poststructuralist narrative analysis often challenges the ways in which prevailing or dominant narratives represent things and criticise the specific assumptions that underlie the accepted narratives (Boje 1995; Buchanan 2003; Buchanan & Dawson 2007; Collins & Rainwater 2005; Martin 1990).

Vaara et al (2016) argue that, these analyses often focus on the problems of narrative hegemony, that is, privileging some narratives over others, and attempt to reveal marginalized voices (Beech et al 2009; Brown et al 2005; Cunliffe et al 2004).

Vaara et al (2016) point to an empirical study of poststructuralist narratives provided by Boje (1995) whose postmodern analysis of Disney focused on storytelling and the various narrative discourses used to describe the corporation’s history. The purpose of the Boje (1995) study was to reveal the marginalized voices and excluded stories of a “darker side” of the Disney legend. This led Boje (1995) to suggest that organizational storytelling may be characterized by totalisms (hegemonic representations), universalisms (universal generalizations), and essentialisms (objectification of experiences) that easily pass unnoticed in more conventional analysis.

Some of the poststructuralist studies have focused on the performativity of narratives, which refers to how specific storylines are repeated and performed with specific implications on people (Vaara et al 2016). For instance, Driver (2009) drew on Lacanian psychoanalytic theorizing to examine narratives of loss in organizational change. In this view, normal discourse or narrative in and through which people construct the self is an imaginary construction or a fantasy for the person in question. This fantasy tends to create a stable identity for the self and “fix” one's desires. In Driver (2009) analysis of 40 stories, she promoted the poststructuralist argument that it is not organizational change
that makes organizations, work and self-lacking, but that it may be change that brings to the surface the lack that is always there.

**Narrative emergence**

Studies with a poststructuralist orientation have also examined how narratives and stories emerge and come to play a central role in the social construction of organizational phenomena and thus stability and change (Vaara et al 2016). Accordingly, narratives are an essential means of becoming in organizations (Chia 1999), which resonates with an understanding of organizations as continuously reconstructed entities (Tsoukas & Chia 2002).

This view has often been called “ontological” as it underlines that narratives socially construct organizations and organizational phenomena, and accordingly it is of special interest to study how certain narratives and not others formed the basis of widely shared understandings (Boje 2008, 2014).

The concept of “antenarrative”—a form of narrative that has not yet become widely shared but has the potential to become one (Boje 2008, 2011)—is useful because it allows one to better understand and examine how specific narratives emerge out of the flux of a number of alternative discourses.

Boje et al (2004) offer an illuminating example of antenarrative analysis in their study of the Enron scandal. They focused on the antenarrative fragments of marginalized and backgrounded stories. They analysed these antenarratives as part of the mediatized crisis where specific antenarrative ideas and practices resonated with particular actors and audiences. They especially pointed out that corporate power seemed to be linked with the logic of heroic storytelling and resistance linked with the logic of carnival.

In a rare example, Cunliffe & Coupland (2011), offer an embodied narrative sense-making perspective. Their analysis focused on the lived experience of the 2001 British and Irish Lions rugby tour of Australia. Cunliffe & Coupland (2011) argue that, people make sense of their lives in embodied interpretations and interactions with others. In their model, this occurs in and through a number of alternative and often contested narrative performances where people try to construct sensible and plausible accounts that are responsive to the moment and to retrospective and anticipatory narratives.
5.3.2. Chosen Narrative Regarding Wider Research Components

The three main approaches provide very different kinds of bases for narrative analysis of organizational stability and change, and they also offer a means to focus attention on specific research questions.

The realist approaches deal with longitudinal representations of stability and change and examine the effects of narratives on other phenomena.

Interpretative studies examine the construction of narratives and focus on issues such as polyphony, providing an important window into the multiple meanings of stability and change and their implications for the people involved.

Poststructuralist narrative studies criticize hegemonic presentations, uncover marginalized perspectives, or examine organizational emergence and becoming. These approaches help to advance our understanding of the dynamics of stability and change in distinctive but complementary ways (Vaara et al 2016).

Table 5.3. depicts each type of narratives with regard to their theoretical source of inspiration, approaches to research, on-to epistemological role of narratives, methods and contribution to stability and change.
### Table 5.3. Narrative Approaches to Organizational Stability and Change

<table>
<thead>
<tr>
<th>Approach to Research</th>
<th>Onto-epistemological role of narratives</th>
<th>Theoretical sources of inspiration</th>
<th>Methods</th>
<th>Contributions to stability and change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Realist approaches</strong></td>
<td>Traditional science: narratives are used to understand phenomena that exist independently of the narratives per se.</td>
<td>Narratives as researchers' constructions of organizational processes. Narratives as sources of data to capture organizational and managerial phenomena.</td>
<td>Various sociological, organizational and managerial theories. Focus on using narratives as sources of data.</td>
<td>Realist qualitative case analysis. Positive qualitative and quantitative Methods.</td>
</tr>
<tr>
<td><strong>Interpretative approaches</strong></td>
<td>Social construction in and through narratives: narratives (and narrative methodology) are in the centre of the analysis. Individual narratives as objects of study per se. Interpretative patterns as key elements across narratives.</td>
<td>Various narrative traditions in psychology, sociology, literary theory and linguistics. Sense making theory.</td>
<td>Various forms of narrative analysis as informed by psychology, sociology, literary theory and linguistics. Analysis of individual narratives or interpretative patterns to form composite narratives.</td>
<td>Construction of narratives. Plurivocality/ polyphony.</td>
</tr>
</tbody>
</table>

Source: Vaara et al (2016)

In the following section the process of narrative inquiry will be explored in further. The story teller, the plot (the main narrative) and interview themes from the plot will be evaluated in terms of exploring organisational change enabled by an ES application.

#### 5.3.3. Story Teller

Story teller is one of the important dimensions in narrative inquiry research as (Pentland 1999) indicates, narrative should be about someone or something. This research is about ES enabled Organisational Change” and the story teller as an active voice in the process of research is myself as the main researcher for this study.
The following plot/story which is designed for this research, narrates in detail with justification about the process of organisational change with the focus on the organisational routines and the conceptual framework which has been explored in the previous chapters in length. The plot has been designed after 10 interviews and literature on ES applications features and organisational change theory.

It is important to note that, the focus of the main plot of this study is the conceptual theoretical framework which has been critically evaluated and justified in chapter 2 & 3. The interview data are considered as “narrative as representation” (Vaara et al 2016) which explain the conceptual framework and enrich the plot. As the study is CR in nature and explores organisational change and stability, some elements of poststructuralist approach (Table 5.3) will be used to explain the process of change. Specifically, “relational affordances”, towards change and stability in organisations enabled by ES applications, is a postmodern approach towards change. Relational affordances doesn’t put all the emphasis on organisations (as in structuration theory) and it doesn’t put all the emphasis on ES artefact (as in institutional theory), but also considers affordances as the relationship (property) between an organisation and ES artefact as a unit of analysis of organisational change.

5.3.4. The Plot

Czarniawska (1998) argues that, in order to explain process theory, researchers need to shift the focus from description to explanation, which requires a story and a plot. Furthermore, Czarniawska (1998) states that, narrative theory is the story in an abstract conceptual model in which generative mechanisms are identified.

The following plot has been carefully developed from the important concepts in the literature based on the ES features and conceptual theoretical framework.

5.4. “Narrative Inquiry towards ES Enabled Organisational Change”

The pace of IT-driven change and innovation and its increasing contribution to business transformation has been a major source of attention and spending in many industries. According to Gartner (2016), total worldwide IT expenditure
is estimated $3.5 Trillion in 2016, which is around 5 percent of the worldwide GDP. According to “digital leadership report” by Gartner (2015), ERP applications (an industry term for mainly Off-the Shelf ES) is considered as one of the main cost categories (%34 in 2015) in majority of contemporary organisations budgeting expenditure.

Zabjek et al (2009) indicate that, ERP systems have become one of the most important tools for companies to get competitive advantages by streamlining the important modules of their business which could result in cost reduction, business process efficiency and effectiveness. Czarniawska (2008) argues that, technology in general and Enterprise System in particular, “makes organising durable”.

Due to the costly nature of an ES from design to adoption and implementation, initially very few large firms and Multi-National Enterprises (MNE) could afford the cost of an ES. Rao & Mandal (2012) indicate that, ES adoption and implementation has been developing towards majority of contemporary organisations including Small and Medium Size Enterprises (SMEs).

The prevalent use of ES nowadays, could be considered as advancement and innovation in IT software packages and expertise of ES vendors achieved by the collaboration with large firms through “best practices” and the development of the ES. The competitive nature of the current market and complexity of the contemporary organisations in the 21st digital atmosphere in the era of “Big Data” should not be neglected.

Implementing an ES supposes to bring unrivalled advantages to business process management and efficient flow of information. IS/IT (Technology) in general and ES applications in particular improve organisational dynamic capabilities and changes the way organisations do business by transforming organisational routines, norms and structures. Hagen & Sinn (2012) argue that, ES can bring unintended (not necessarily negative) micro-level organisational changes. In a recent study on enterprise system implementation Bernroider et al (2014) argue that, ERP applications facilitate the relationship between dynamic pre-adoptions capabilities and ERP enabled organisational change.
The significance of Enterprise Systems for the majority of contemporary businesses and organisations has been discussed above. Although there have been various researches and practices both in academia and industry respectively which confirm that ERP adoption failure rate is still high and some organisations take a very cautious approach towards selecting an ES application. Some organisations find it difficult to get the potential and expected benefits from implementing such applications. In other words, they could not replace ERP systems with their legacy systems as they could not manage the changes associated with Enterprise Systems (Ngai et al 2008).

5.4.1. Introduction of ES applications in Organisations

Robey et al (2002) argues that, implementation of ES packages are often associated with more fundamental organisational improvement efforts, such as Business Process Reengineering (BPR). Indeed, the primary benefits of an ERP installation may result from new business processes, organisational structures, human resource skill requirements, and knowledge management.

One of the most important dimensions in adopting an ES for organisations is the current business processes of the company and whether it is aligned with chosen ES artefact. This statement highlights the notion of “system design” in terms of understanding of the current situation of the firm and how the firm wants to achieve productivity and efficiency through an IS/IT software package, for instance, an ES Application; as Mumford (1995) puts it, computer system design is associated with “Problem Solving Philosophy”. On the other hand, Enterprise systems are introduced into social systems i.e. an organisation. It is important to consider the social aspects of the system in terms of designing an ES, which implies that an ES is a socio-technical system.

Enterprise System vendors have one of the most important roles in the process of ES design and introduction to the organisations. From an economic perspective, ES vendors sell the ES applications to the organisations. In this regard and in the competitive market between ES vendors, it is important for vendors to design their products which are more efficient and also appropriate to adopting organisations.
Enterprise System applications are designed by software and programme developers. In this context, there are various roles in ES vendors who have access to broader organisational processes and various business and strategic objectives of the organisations. These people can translate the business processes and organisational requirements into programming and computer language codes and facilitate the design by assisting the end users to clarify their information processing requirements (Bell & Wood-Harper 2003).

Enterprise System Architects, System Designers, System Analysts and Business Development are some of the important roles mostly based in ES vendors which design an ES and introduce the applications to the organisations. Bell & Wood-Harper (2003) argue that, system designers need to perform a detailed analysis of working systems with other stakeholders in the organisations in order to develop a working socio-technical system (STS).

5.4.2. Framing the Change Approach Enabled by Enterprise System Applications

New technologies change the way people act, organise and communicate their social relations (Kallinikos et al 2012). Introduction of ES applications as IS/IT artefacts in organisations is accompanied with changes in some of the fundamental organisational elements and changes the way organisations organise their activities.

In framing the change approach introduced by an ES, academics tend not to accept the statements as ES “Shape”, “Determine” and “Create” change in organisations. But also, they incline to argue that ES as IS/IT (Technology) “Enable,” “Occasion”, “Afford” “Enact” “Make Possible” “Co-Construct” or “Mutually Constitute” the change in organisations. (Kallinikos et al 2012).

Volkoff et al (2007) argue that, in order to frame the organisational changes introduced by ES, research needs to take a holistic approach towards both organisations and the material aspect of technology i.e. Enterprise System (ES) applications. They argue that various researches on ES organisational change have taken deterministic approaches. For instance “Institutional Theory”, which tends to ignore organisations (agency in theoretical terms). The other extreme of research tends to ignore the material aspect of technology, for instance, structuration theory (Giddens 1984), to explain such changes.
Furthermore, in ANT – Actor Network Theory, (Latour 2005), technology is considered as a concrete object and research ignores technology’s distinctive characteristics.

It is suggested that research consider both elements i.e. ES application and Organisations as a Sociomaterial (Orlikowski 2007) assemblage in order to be able to frame change in organisations. Enterprise System (ES) is not apart from the organisation in the process of change and it is intertwined in the web of social practices in organisational activities and processes.


Recently, there have been studies in the impact of IT on organisations with the focus on organisational routines, through which scholars extended the theory of organisational routines and put a materiality dimension (Technology) at the centre of the so-called ostensive and performative (Volkoff et al 2007; D’Adderio’s 2008, 2011; Feldman et al 2016).

Following figure shows the development of framing change based on the organisational routine elements considering the materiality (IT Artefact) developed by (D’Adderio’s 2008, 2011).
It is argued that in the context of this research, Enterprise System application can be regarded as a materiality of technology (Artefact in D’Adderio 2008) framework. The performative aspect of organisational routines can be considered as the actual performances of organisational activities in an organisation. The ostensive aspect of routines is routine in principle (abstract idea of the routines) and can be considered as those rules and routines which can potentially be done by organisations but they may not necessarily be performed in an organisation.

**Figure 5.4: Artefacts from the periphery to the centre of routines**

Source: Adopted from (D’Adderio 2008)
5.4.3. Process of Change in Organisations by ES

In order to analyse how change unfolds in organisations considering ES applications, this research developed a conceptual theoretical framework which maps ES application/technology and organisational routine dimensions on the stratified ontology of Critical Realism (CR). See the following; Figure 5.5.

![Conceptual Framework on Enterprise Systems Enabled Organisational Change](image)

**Illustrated by the Author: Moshiri (2016)**

Figure 5-5: Conceptual Framework on Enterprise Systems Enabled Organisational Change

In this regard, the theoretical consideration for this research is methodologically and philosophically driven. From an epistemological account, the important dimension in CR driven studies, is exploring the generative mechanisms. Volkoff & Strong (2013) argue and justify that, the concept of affordances (Gibson 1977, 1979) is aligned with generative mechanisms.

In this regard technology affordances (in this research; ES affordances) are considered as the main element in exploring change and stability between organisational routines components. The empirical data has been collected from ES vendors and particularly ES designers, System Analysts, ES architects and Business Developments which in fact design, architect and facilitate ES adoption by organisations.
A relational approach (Stoffregen 2003; Sayer 2010; Leonardi 2011; Kane et al. 2011) towards ES affordances and organisational routine elements has been considered as the main focus of the research and consequently the main focus of the interviews. The analysis and findings are considered to enhance understanding on the nature of ES from relational view on affordances and explore systemic view on change and stability through influence and interplay of ES in organisational routines dynamics.

The logic of the analysis is retroduction (Sudabby 2006), in which the conceptual theoretical framework has been developed. In essence this research considers the theory of organisational routines as a vehicle of change and stability in organisations as a “given theory” and modifies the existing theory through the process of the research by interviews from ES designers, ES architects, business developments and system analysts. As Sudabby (2006) puts it; in retroduction, “Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth”.

5.5. Structural Elements of the Narrative Plot

The narrative plot has been designed after 10 interviews and secondary data. Secondary data include literature on organisational change theory, ES applications’ features and relational affordances. The narrative plot has been analysed in further detail based on the narrative structural elements. The following subsections, explore important elements of the narrative in further detail.

5.5.1. The need for Enterprise Systems

One of the main structural elements of the narrative plot can be drawn as the significance of an Enterprise System for the majority of contemporary organisations. The reason could be conceived as follows;

- Information overload; companies nowadays in the era of big data are faced with vast amount of information from customers, suppliers, market data, various products spec etc. In this environment having centralised IS/IT applications like an Enterprise System could bring
visibility and transparency in terms of information and can assist every organisational module and facilitate decision-making processes.

- **Process Efficiency and Cost Reduction:** Organisations through adopting an ES can make the business process more efficient which leads to cost reduction. For instance, technology displaces employees and can be regarded as more efficient in terms of time. A typical example is; “IT Payroll System”

- **Business Models and Innovation:** Due to enormous competition in the 21st century business environment, organisations are constantly exploring ways to develop innovative business models in terms of pricing, new products etc. to survive in the market. Adopting an ES would bring unrivalled advantages to companies in terms of data and information about other firms and competitors and customers and equip them to proactively design, produce and offer products for customers through innovative business models. New e-business models for instance sharing economy (Uber, Airbnb, Amazon etc.) empower organisations to create value by centralised integrated ES application.

### 5.5.2. Enterprise System Design

Designing an Enterprise System as mentioned in the narrative plot can be considered as a socio-technical system design, in a sense that ES vendors need to consider designing and embedding social and organisational requirements in the ES artefacts. It is important to explore how the actual process of ES design is developed by ES vendors. In this regard, from the narrative plot various points can be conceived as;

- **Business Process Reengineering:** It is argued in the narrative plot that an effective ES application for companies comes with Business Process Reengineering (BPR). Legacy systems and organisational routines before introducing an ES might not be efficient and hence introducing an ES brings changes to the old processes. This might be costly for various organisations and many organisations, for instance SMEs cannot afford the cost of reengineering and the customised ES.

- **Off-the Shelf ES:** ERP application might be considered much cheaper for many organisations, for instance, SMEs. Companies can look into the ES
market and find a suitable ES application which matches and aligns their business processes with little customisation.

- **ES Best Practices**: ES best practices could be considered as those ES which can best fit an industry or specific product. For instance, an ERP application for Banking and Insurance Industry or an ES best Practice for grocery retailers. ES best practices might be developed through years with enormous investment of big organisations and ES vendors in order to find an efficient ES application for specific industry or a specific product market.

### 5.5.3. ES as Change Enabler

One of the important dimensions of the ES as a change enable agent is the concept of “Affordances”, which is argued in the narrative plot with reference to the conceptual theoretical framework. It is indicated that the relational approach on affordances is considered to explain change in this research. In this regard, it is important to explore the notion of “Affordances” with the interviewees (on the second round) centred on the following themes;

- **ES Features**: Enterprise Systems as discussed in the literature review and in the narrative plot have some certain features in terms of functionality. For instance, Central Database, Structuring Data, Visibility, Transparency and Real-time access to information etc. This could be a quite useful template for the interviews in terms of technology and ES features and functionality.

- **Organisational Processes (Routines) Features**: This research does not specify processes and routines in the organisations, but the collective organisational routines that may be changed by an ES, is the main focus. In this regard, various roles in organisations would be explored in terms of their affordances from ES.

- **ES - Organisations Affordances**: A relational approach towards affordances has been justified for exploring change and stability which is enabled by ES applications in organisations. The analysis of the data would be centred on two main macro generative mechanisms as; Stability and Change.
5.6. Interview Process

This research has been done with 21 in-depth semi-structured interviews from 9 professionals in the area of ES design and ES architecture in the duration of 26 months. The profile of interviewees and number of interviews can be found in Appendix C. Interviewees were chosen from mainly Enterprise System Vendors and ES consultants in the UK and 1 interviewee is an academic in the area of technology and social organising. This research is started by purposive sampling followed by snowball sampling technique (Saunders et al 2016).

Enterprise System Vendors have been considered as the main source of data for this research as it is argued and justified that, certain roles associated with ES vendors have access to wider information in terms of ES design and ES features in terms of architecture which facilitate change processes in the organisations.

The narrative inquiry for this research has been considered as a single research strategy. The number of interviewees is 9 people and with reference to (Chase 2005, Musson 2004) narrative inquiry could be conducted with very few numbers of participants (less than 10) as when the researcher believes that the participants can provide thick descriptions of the organisational phenomena.

The first sketch of the narrative plot has been developed after 10 interviews from October 2013 to September 2014. Each interview was lasted around 1.5 hours with the structural element of the plot. However, when the research was progressing in terms of further literature and observation and consulting with the academic supervisor, further alignments to both the narrative plot and interview questions has been done and the remaining 11 interviews have enriched the current plot from November 2014 to December 2015.

11 face to face (onsite) interviews have been tape recorded and the role of myself (as the main researcher) has been guiding and leading the discussion through the main elements with reference to the plot. Two interviews have been conducted via telephone and two interviews via skype conversation. In telephone and Skype interviews the consent of the interviewee has been taken during recording of the conversation. Certain roles in specific companies didn’t conform to recording the conversation and note taking has been done.
The consent form (Appendix B.) was used in all of the face-to-face interviews and it is agreed that the name of the participants either would be changed or put as anonymous in order to conform to the confidentiality of data and information.

In all of the interviews, an information sheet (Appendix A.) has been used for the background information of the research and also aims and objectives of the research in order to set the context for informed discussion.

5.7. Narrative Data Analysis

Conventional approach towards narrative data analysis (De Fina & Georgakopoulou 2008) has been done with the focus on the structural elements of the interview guide and the conceptual framework which have been explored in further in the previous sections.

5.7.1. Data transcription

All interviews have been done in “English Language” and the recorded interviews have been transcribed by “myself” as the main researcher. The justification behind data transcription by the researcher is not to avoid any technical terms and misunderstanding with other vocabularies and concepts in various fields. As there are some terms and concepts which both the interviewee and the interviewer are informed about them based on shared understanding. For instance, terms like ERP, ES, Change Enabler, Cloud Solution, Shared Platform, Industry Solution, Organisational Processes, Activity Model, Workflow Blueprint, SOP, and Affording ES etc. might have various meanings and definitions for people in other fields. These terms were mentioned in the interviews as abstract terms and might not be easily transcribed by people who don’t have the knowledge of IS/IT and organisation and management literature.

According to Mello (2002), it is highly beneficial to compare and contrast related parts of different narratives to understand various perspectives associated with the concepts and issues. As the views from several narratives may be more insightful than using the view from only one, the findings would be more credible by having various accounts in approaching a concept and/or validating a theoretical account.
In this regard, all interviews have been carefully read and categorised based on their structural elements, aligned with the interview guide and the narrative plot. The process of data collection and narrative has been narrowed down to identify and explore the most appropriate information regarding ES enabled Organisational Change.

5.7.2. Process of Analysis

The first sketch of the narrative plot has been designed after 10 interviews as the main source of data and secondary data as literature on organisational change theory and ES application features and the conceptual theoretical framework. The second round of interview is considered as “narrative as representation” (Vaara et al 2016). In other words, second round of interview enriches the narrative plot and explain the conceptual theoretical framework with practical examples regarding ES features and organisational routines.

Figure 5.6. depicts the process of analysis in schematic form.
Figure 5-6. Schematic Process of Data Analysis
5.7.2.1. Narrative data (interviews) as Representation & Data

Narratives can be used as sources of data to access phenomena that exist independently of the narratives in question. This is consistent with wider realist philosophical approach, as the reality in realism can exist independent of us (Vaara et al 2016). In this study interview data has been used to explain the conceptual theoretical framework which is consistent with realist perspective discussed earlier. The following section, the interview data will be explored aligned with the enriched narrative plot.

5.7.2.2. Making sense of Interview Data Aligned with Narrative Plot

The significance of ES for Organisations

One of the main themes of the interviews has been, the significance of having a IS/IT software package like an ES for organisations to manage organisations business processes. There was a consensus in the majority of responses that “Having an ES for organisations is a must rather than a choice”.

As the interviewees, have been chosen from variety a of technical roles (programmer, data analysts etc.) towards more soft skill roles like “Enterprise Architects” and “Business Development associates” and “System Designers”, there has been various points of view on the significance of an ES for contemporary organisations.

Responses from technical perspectives have been centred on the need for a software package which can structure the data in the company as the complexity of data and information is developing very rapidly. Furthermore, the new enterprise system should be aligned with the legacy systems and current organisational business processes and routines with less customisation. For instance, an interviewee (who is working for one of the major software vendors) response was;

“Organisations cannot manage their data in the competitive economic environment based on their traditional and legacy system. An ES by having a centralised database can facilitate the flow of data and information between various departments. Having an ES which its central database is aligned with market and industry data, for instance data about competitors, suppliers and
customers, contribute to high efficiency in the company” (Data Analyst at ES Vendor).

On the other hand, responses from more soft skill roles in designing an ES, has been centred on organising business processes and the focus on people. An Enterprise Architect from a major ES vendor in the UK has mentioned the following in response to the significance of an ES for contemporary organisations.

“Organisations by having an ES, can organise their structures and routines much effective than before. In other words, it is about transparency and bigger picture in the organisations rather than adopting an ES because other companies using it. It is expensive, it is a big project and a big decision, however if you don’t have it, you are not in the market anymore!”

Although ES implementation is a big project and a big decision for all companies as mentioned by interviewees, it is important to explore the complexity of an ES design and its adoption by organisations in further detail.

The next important theme of the interviews has been centred on business processes and organisational core functions. When an ES is introduced into an organisation, there should be an alignment between organisational business processes and functions with the chosen ES. ES could make an organisation more efficient by translating organisational processes into an ES artefact. In this regard, the next section, businesses processes and organisational core functions will be explored and responses will be analysed in further detail.
Organisational Routines and Organisational Core functions

Responses to the question of “the processes of introducing an ES into an organisation” have been centred on the concept of Business Process Management (BPM) and Business Process Reengineering (BPR).

The targeted interviewees for this question were professionals in system design and business development. Interviewees were asked if they are offering a specific ES to specific organisations or if they take part in exploring the organisation first and finding out the core functions and processes of the organisation before designing the ES based on the organisation’s core functions and business processes.

Following figure (Figure 5.6) shows some important modules and the processes within each department of the contemporary organisation, although this is not an exhaustive list.

![Figure 5-7: Core Organisational Functions](Illustrated by the author)
**Ostensive Dimension (Roles, Processes, Workflow)**

Interviewees agreed that an ES would support various roles in the organisation. Organisational business processes would be translated into the ES artefact and those processes and roles can be done via the software. These roles and processes can be translated to the ostensive aspect (roles/routines in principle) of the routines which was discussed in the literature and theoretical framework.

The interesting finding in this section has been centred on the “Process of Organising” from within the company itself regardless of an ES. For instance, one of the interviewee mentioned;

“*Organisational Effectiveness and improvement starts from within the company by well-balanced BPM and BPR. ES is just a tool to facilitate this process and most of the time we as ES designers learn a lot from successful organisations by working with variety of people and roles, that’s a great part of it.***”

The important notion reiterated by interviewees was that, successful organisations, in terms of effective business processes, collaborate with ES designers for ES best practices and industry solution. One of the biggest ES adoptions which was mentioned by one interviewee who works in health industry in Europe and in the UK, resulted in an ERP best practice and industry solution for the healthcare sector.
Table 5.4 shows basic organisational functions and processes which are supported by SAP R/3

<table>
<thead>
<tr>
<th>Financial</th>
<th>Sales &amp; Marketing</th>
<th>Operations &amp; Logistics</th>
<th>Human Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts receivable &amp; payable</td>
<td>Pricing</td>
<td>Inventory management</td>
<td>Payroll</td>
</tr>
<tr>
<td>Asset Accounting</td>
<td>Sales planning</td>
<td>Purchasing</td>
<td>Personal planning</td>
</tr>
<tr>
<td>General ledger</td>
<td>Sales management</td>
<td>Project management</td>
<td>Travel expenses</td>
</tr>
<tr>
<td>Profitability analysis</td>
<td>Order management</td>
<td>Quality management</td>
<td>Human resources</td>
</tr>
<tr>
<td>Financial consolidation</td>
<td></td>
<td>Routing management</td>
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<td>Vendor evaluation</td>
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This is consistent with Davenport (1998) view on ES, which is that an ES can support various organisational functions and modules with a central database. Figure 5.7, shows schematic anatomy of an enterprise system on how it connects organisational functions and rules via a central database.

Figure 5-8: Anatomy of an Enterprise system.

Source: Davenport (1998)
Performative Dimensions of Routines

ES application supports various organisational functions and processes in an organisation as discussed earlier. These functions can be considered as the ostensive aspect of the routine which is consistent with the view of (Berente et al 2016) on organisational functions and processes. Although ES shapes and defines organisational functions and routines or routines in abstract form, people in the organisations might do it differently or there is degree of variation between what is defined by the ES application for the specific routines and how the routines are performed by people in the organisations.

Interviewees’ responses on this theme have shown that even system designers do not and cannot expect some performances of people from ES features, but people during time, as they learn and experiment with the ES, they afford new possibilities for action. This is consistent with Robey et al (2012) on the relationship between the performative aspect of routines and the material (ES/Technology) aspect of routines. The following quote from an ES Architect who works for a major ES vendor shows this angle in further details;

“Designing an ES is a continuous process and that’s why majority of ES applications today follows a subscription business model (updating and upgrading). We offer/sell a generic ES application to companies which support main organisational functions and activities [Organisational Routines], and after sometime when users practice with the system [Performative Dimension], they come up with new possibilities, needs and requirements which they found out and experienced during the time of working with the system, then subscription business model means we embed the revised requirements [new possibilities that users afford from working with the system] into to ES and this process continuously repeats as there is always new possibilities for action. It is important to mention that we try not to design the ES, so rigid and strict on the first instance. Although the changes and amendments might be because of business environment and economic changes as well!”

System Design & Organisational Routines in ES

The problem of reconciling users’ requirements and ES designer perspectives is not an easy task. As discussed in the previous section ES designers cannot think of all possibilities for action from a user to embed it in ES architecture. ES is designed for social settings which people (users) have intentions to use the system. However, one of the expected benefits of an ES in an organisation is
exerting more control over the system. In this regard, functional events and processes do not necessarily follow a specific order in social settings and it can be done in a myriad different ways.

Following examples can portray how processes could be carried out in an organisation in a variety of ways.

A company which is in the process of marketing their products might follow the five simple steps and activities [the roles are supported by company’s ES] to sell the product;

- The sales departments identify potential customers.
- The sales representative contact potential customers
- The customer negotiates about the product
- The customer orders a product
- The product is shipped to the customer.

The marketing team and sales representatives use a flexible ES to access variety of ways to contact customers. For instance, they can meet the customer in their company, they can have a phone conversation, they can contact customer via skype/email video conferencing etc. Although the routine (contacting customer) is embedded in the ES, the performative aspect of routine or how the routine is being done in practice can be done in variety of ways as mentioned above.

This scenario leaves open the possibility for improvisation by the users (sales representative) if the role/routine calls for it. Furthermore, it places the responsibility for making that decision on the person responsible for the carrying out the routine (in this case; sales routine).

It is important to have a holistic view on various functional processes which are carried out in an organisation with the focus on users (human agent) and an ES (Artefact).

Figure 5.8. show the main possibilities (4 options) that can occur in an organisation in terms of carrying out the processes considering an ES.
It is argued that ES designers and consequently management teams in an organisation which is adopting an ES, have the strongest control, hence further efficiency in Artefact – Artefact functions and indefinite (speed and efficiency of IT & computers) efficiency and automation. This is due to highest efficiency, which can be brought by an ES in which all functions are carried out by the technology of the ES and no user (human agent) involvement. This option could be considered as a desired option for ES designers and organisations due to highest control and efficiency.

On the other side of the extreme, i.e. user – user box, ES designers and management teams have the weakest control over the organisations and/or how the processes are carried out. The argument towards this scenario is that users are rarely inclined to do exactly what they are told to do!!

On another two options, which is the case for the majority of organisations in a sense that all organisations are involved with human factors rather than just machines interacting with other machines; designers and the management team have the intermediate level of control over the organisation.

Culmsee & Awati (2013), proposes the following steps in order to design a well-balanced ES considering organisational routines;

\[\begin{array}{|c|c|}
\hline
\text{Human-Human:} & \text{Artifact-Human:} \\
\text{designer has weakest control} & \text{designer has intermediate level of control} \\
\hline
\text{Human-Artifact:} & \text{Artifact-Artifact:} \\
\text{designer has intermediate control} & \text{Designer has strongest control} \\
\hline
\end{array}\]

*Figure 5-9: Human - Artefact grid*
Reinforce the patterns of the routine: Organisations have to invest in practicing the routines. Practice connects the abstract routine (Ostensive Dimension) to the performed one.

Consider every stakeholder group’s point of view

Understand the relationship between Ostensive and Performative Dimensions of Routines.

Encourage people to follow patterns of action that are important:

Make it possible for users to become designers:

Lock in actions that matter: Notwithstanding the previous point, there are certain actions that absolutely must be executed as designed. It is as important to ensure that these are executed as they should be as it is to allow people to improvise in other situations.

Keep an open mind and invite engagement

ES Features

An important theme of the interviews has been on the core features of an ES which enable organisations to do the old things in a new way with further efficiency. Interviewees’ responses to this question have been centred on the following;

Common Database and further Visibility/Transparency and Traceability;

Majority of the interviewees agree upon the common and shared database of an ES which enable the majority of organisational roles to do their jobs with more efficiency and transparency. However, there is an agreement that the common database can constrain some jobs and roles and the user might resist doing the routines in the new way. The following quote from one interviewee regarding the common database is as follows;

“Some users know some potential of an ES in terms of traceability and transparency and they think that if they do something wrong in an ES and/or they don’t do something what they are told [in compliance with ES explicit rules], managers and supervisors could monitor their performance and see the footprint on the system. So, they try to skip the system as much as they can. For instance, manual data entry instead of scanning, or calculating with basic calculator and put the result on the selected tab, obviously, this might
result in inefficiency of the system [in terms of time], because users skip the system [resist to new working rules/routines].”

Organisational Context and Culture

One of the important dimensions which can be derived from interviews, but has not been considered in the narrative plot; is “Organisational Culture”. The reason to include this theme is that, “organisational culture” is the prevalent concept in nearly all of the interviews from the business side and people who have more soft skill roles in system design and system architecture. A comprehensive quote from an enterprise architect who is working for a major ES vendor in the UK as follows;

“It is about the culture and spirit in the organisations. IS/IT software packages is just making the system work more efficient. On the other side IT makes an inefficient system much faster inefficient! We learn a great deal from working with big innovative companies and many industry solutions developed by years of collaboration with big companies to understand the culture of these companies. They [innovative companies] have everything to run their business as effective as possible …they have appropriate roles, they know how to manage and overall they have unique leaders. ES learn from these companies to design more complicated products [ES applications] which suite cutting edge firms as business solutions.”
5.8. Summary

This chapter provided detailed information and steps about the implementation of the research. Narrative inquiry process in studying change by introducing ES applications in organisations has been explored and has been applied to this research. Furthermore, the process of interviews and narrative data analysis based on the structural elements of the narrative plot and making sense of interview data have been explored in further depth in this chapter.

The next chapter provides detailed information about addressing the research questions which have been explored in the first chapter of this research. The conceptual theoretical framework will be reviewed and revised in further based on the findings of the research. A relational approach towards affordances based on two main macro generative mechanisms as; stability and change will be critically evaluated.
6. **CHAPTER SIX - FINDINGS & DISCUSSION**

6.0. **Introduction**

The contents of this chapter fall into three sections. In the first section under the heading of findings, relationship between ES features and organisational routines will be analysed in further detail. Seven relational affordances which describe generative mechanisms in the process of change will be evaluated. The findings will be analysed with the focus on “ES – Organisations Affordances”. The second section of the chapter six, will be focused on the discussion on the main findings. In the discussion section, the conceptual theoretical framework will be reviewed and will be explored in further detail in terms of generative mechanisms. Two main generative mechanisms as enabling change and constraining change will be discussed and critically evaluated based on the literature on innovation and control and integration. The last part of the discussion section draws further discussion on organisational routines alignment and the significance of control and integration as one of the main objective of an ES in contemporary organisations.

Finally, a brief summary of the chapter will be drawn and the link to the conclusion chapter will be stated.
6.1. Findings

6.1.1. Relationship between ES Features and Organisational Routines

The major part of the theoretical framework has been discussed with quotes from interviews through data analysis. A relational approach towards affordances, which is the main part of theoretical framework, can explain and shed light on the relationship between an ES application [features] and an organisation. Two key dimensions of the main research question i.e. enabling and constraining change by ES will be explored in further depth. Seven affordances have been derived from data analysis with reference to the narrative plot and the research questions. The following section explores these affordances with respect to ES application features and organisational routine dimensions.

6.1.2. Relational Approach towards Affordances

Affordances 1 – (Constraining – Enabling)
*Capturing and Recording Data about Customers/Suppliers and Transactions within an Organisation.*

One of the main features of an ES application is having a central database which integrates data and information from an entire organisation to a single platform. This aspect of an ES application enables organisations to carry out various needs/requirements and routines in relation to access to certain information in real-time and perform more efficiently.

The information and requirements in most of the contemporary organisations can be seen as market information and various organisational modules data (for instance; financial info, manufacturing data, production rate, marketing info etc.).

This feature of an ES is a generic feature common to the majority of contemporary enterprise system applications which can also constrain some changes in terms of innovation and development. The argument can be framed that; in a competitive market environment, if all competitors have access to market and industry data, all organisations can be the first mover. This is
consistent with literature on ES best practices and competitive advantage as; organisations adopt and implement ES applications to enable them to realise their competitive advantage (Porter 1998; Pisano & Teece 2007).

The argument is, if an ES best practice as a business solution fits into all organisations and industries, there exists little room for unique organisation’s competitive advantage or specific industries’ competitive advantage. Gratton & Ghoshal (2005) indicate that, organisations need more than ES best practices to stay competitive and be innovative.

It can be argued that organisations need to invest further on a tacit and implicit aspect of organisations’ dimensions (for instance; organisational culture) which contributes to their competitive advantage (Shao et al 2012, Teece 2014) and hence ES enables effective organisational changes towards further innovative business solutions. It is argued that an ES is just a tool (technology) and it could make an inefficient system, much faster inefficient!

Affordances 2 – (Constraining – Enabling)

Access to Cross-Functional Real Time Data/Information

One of the most important features of an ES application is considered as having a common database which is filled with structured organisational data. This aspect, which shapes some of the fundamental organisational roles and routines, could enable organisations to structure various organisational requirements.

A typical example is companies’ intranet and communication systems which correspond to communication routine. For instance, employees could manage meetings and have conversations real-time, through go-to-meeting, Lync, company’s intranet applications. This feature of an ES which is supported by internet and IS/IT technology, on a broader level facilitates flow of data and information throughout the entire organisation and potentially leads to further efficiency in various roles. A typical example could be considered as when scheduling a meeting with a manufacturing team, staff could attend the meeting remote and there is no need for physical on-site presence.
This ES application feature could also potentially constrain organisational change and could enable organisations for further control and integration due to transparency in the entire organisation.

**Affordances 3- (Constraining – Enabling)**  
*Monitoring and Observing Organisational Processes.*

One of the most important features of an ES application could be considered as the monitoring and evaluation feature. This feature is regarded as the “Traceability and Audit” feature in industry term. It is argued in the chapter five that the most desired scenario for system designers is Artefact/Artefact interrelationship. In this sense, various monitoring and evaluating routines are embedded within an ES application for overseeing other routines and processes which is being done by the ES application itself.

This approach towards system design could potentially enable organisations to perform with highest efficiency and control which is the rational of the technical approach towards system design.

The “Traceability and Audit” feature in the “ES application – User” (human-artefacts) scenario could potentially indicate which process/function is done by whom, when and where (in terms of location). In terms of the ostensive dimension of the routine, there are audit roles in an organisation which can be done by an ES itself or human agent (auditor). An example could be when an auditor company e.g. KPMG, audits and oversee the financial information of an organisation to be aligned with market regulations and legal issues, for instance taxing issues.

According to Spanaki & Papazafeiropoulou (2016), “Integrated Enterprise Systems” supporting holistically the risk, control and auditing functions of organisations related with the GRC (Governance, Risk and Compliance) principles”.

Relational affordance can be considered as both enabling and constraining towards organisational change aligned with the design of the ES application to explain this feature.
It can be argued that one approach towards ES artefact design is that it is a rigid and inflexible system which could potentially capture main organisational processes and routines. This scenario is aligned for those companies which need further control towards their organisational processes and look for mainly off-the-shelf ES applications and/or migrating from their legacy systems to a new ES application. In this approach, ES applications potentially constrain organisational changes due to inflexible and rigid technology and the objective of those organisations to adopt this scenario would be on further control and further transparency towards their system.

Sykes et al (2014) argue that, introduction of an ES into an organisation might hinder the user job performance as it alters business processes and associated workflow which might not in accordance with users’ expectation. Off-the-shelf ES application which is designed to meet the expectation of generic organisations and generic organisational needs rather than specific and unique organisational requirements can hinder job performance and user satisfaction.

However, auditing and traceability feature could enable change in organisation by finding the loopholes in the organisational processes. For instance, if a process which is being done by a user, needs more time/resource then further consideration can be identified through system monitoring.

Business Process Redesign/Reengineering and BPM can be considered for identifying and revising the inefficient process. This scenario in terms of ES design can be considered in organisations with intensive collaboration with ES vendors and consultants and consequently considerable investment on Business Process Management (BPM) and BPR and transforming organisational routines consequently.

**Affordances 4- (Constraining – Enabling)**

**Access to Rich Information for Decision-Making Purposes**

Another relational affordance which can be perceived from the relationship between an ES application and an organisation is “Access to Rich Information for Decision-Making Purposes”. There are codes and protocols for certain roles defined by ES designers in the technology of an ES which enable various
organisational changes towards efficiency defined for specific roles in the organisation to access these data and information.

A typical example would be payroll system, shift pattern, sick-pay, annual leave etc. accessed by HR department or personnel planning department. This feature of an ES application leads to further efficiency of the system and consequently enables organisational change.

This feature could be considered as constraining change in organisations as well. When certain roles in an organisation attempt to conform with the requirement of an ES application, for instance, when in a manufacturing setting, a line manager cuts the number staff or cuts the number of hours to comply with the ES application which works with the efficiency rational, staff might be demotivated and may look for other jobs. In this regard, some certain soft skill roles with the aim of maintaining organisational culture towards various stakeholders in the company could be defined/or called upon to tackle this issue. This is consistent with Sykes et al (2014) study on ES implementation and employee job performance as they found that “workflow advice and software advice are associated with job performance”.

**Affordances 5 – (Enabling)
Process Redesign and Improvement**

One of the important features of an ES is “compare & contrast of reports and data for various scenarios” under the process modelling option (See table 6.1 SAP various application functionality). This feature could be labelled under process redesign and improvement affordance. This affordance can be considered as enabling organisational change towards improvement.

In terms of ostensive dimension of organisational routines, certain roles in Research and Development (R&D) in organisations could be considered which support this function. This feature which might link with other ES features could potentially be restricted to certain roles in an organisation. R&D roles equipped with this ES feature could offer a new product or revised process blueprints based on efficient analysis and comparing/contrasting various scenarios available for a product or processes.
Various subjective aspects of the organisational context in terms of the human dimension (agent) recognise that organisational structure and culture should not be neglected. Although an ES application incorporates this capability/feature; with an inefficient organisational context (management hierarchy, organisational structure and organisational culture), this affordance might not be effectively realised.

This is an important issue in ES implementation context and scholars have paid considerable attention to the role of the user, context of implementation and organisational culture (Jasperson et al 2005, Morris & Venkatesh 2010, Ke et al 2013). It should be noted that this affordance could be realised in its effective way when organisations can articulate the wider strategic goals and objectives i.e. product market positioning and industry positioning. Furthermore, well-balanced organisational structures can facilitate the sharing of wider organisational and strategic objectives.

**Affordances 6 – (Enabling)**

**Go to Market and Product Design**

“Go to market and product design” is another relational affordance which can potentially enable an organisation to achieve its wider strategic goals and objectives. According to Wang (2016), Business intelligence (BI) is a powerful tool in ES application to conduct causality analysis and corporate diagnoses.

BI can enable an organisation with a data-driven approach which links organisations’ wider strategic goals into tactical policies and operational actions. BI module incorporates sets of architectures and techniques such as data warehousing, data mining and database, which potentially enables users (organisations) to transform raw data into useful information to provide support for decision. This affordance is similar to the previous affordance in terms of the ES application feature. The analytics feature in most of the contemporary ES applications equips companies with strategic vision and market predictability and forecasting.

This feature enables organisations on whether it is viable to go to some certain industries and or invest on some certain products based on the information provided by the BI feature. It is mentioned in table 6.1., that this feature is
useful in various strategic management roles and routines. In most of the contemporary organisations, the ostensive aspect of routines (Strategic management role/routines) could be equipped with certain information from “Analytics” and enable companies to act proactively in the market. This feature could be restricted to some “C” level and management roles in organisations.

The argument towards affordances for this feature of an ES could be framed in a balanced approach on both side i.e. ES Feature (Analytics) and Effective strategic managers/user [organisational aspect]. Organisations can get the most benefit [can afford this function effectively] if the human side [roles] perceive the functionality.

Loshin (2013) argues that, although BI application is equipped with well-balanced models and frameworks in its architecture, users cannot certainly rely on the application which indicates to the importance of insight and intuition of users related to data and information.

Cao et al (2013) in the context or ERP implementation benefits argue that, it is significantly important for the managers to develop a sound intuition about the provided options by the ERP interface. In another words, whether the provided option by the ES in theory can be implemented in practice or not (Benaroch 2002). This is due to the holistic understanding that managers might have acquired effective insight from the market that comes from implicit and tacit aspects of market knowledge and cannot be translated into ES business analytics and the BI module.

This is consistent with literature and surveys from management information systems directors. Managers recognize and value the presence of real options, although purely based on intuition (Benaroch et al 2006; Tiwana et al. 2006).

**Affordances 7 – (Enabling)**

**Business Model Innovation**

Business model innovation can be considered as one of the important affordances which can be perceived from the novel ES applications. Table 6.2. shows various SAP ES based on the functionalities, “SAP NetWeaver Process Orchestration” and “SAP NetWeaver BPM” applications support process modelling features.
Business Model Management System (BMMS) supports the decision-making process which incorporates collaborative process modelling and heterogeneous integration features. BMMS could potentially enable organisations to proactively design innovative business models and redefine their strategic objectives.

Blaschke et al (2015) indicate that, the digitalization of the business infrastructure and advancement in ES application, results in growing relationships between processes, products and services across various industries. This development in ES applications affects how companies run their business. Chesbrough (2007) point to the development of new business models which enable industries to maintain their competitive advantage.

According to Blaschke et al (2015), business model innovation in the context of IS/IT software packages has received significant attention by both academic and industry practitioners. They argue that business model innovation represents the core logic of an organisation and also it defines how the values are created and delivered to the customers. This feature also could be accessed by “C” level and strategic management roles in organisations.

There have been attempts to develop efficient business model (BM) methods and tools in ES application. Blaschke et al (2015) indicate to the most popular BM as “Osterwalder’s Strategyzer”, which enables users (performative aspect of routines) to systematically develop their value propositions.

Other BM elements, such as “the tool”, can visualize all information in a suitable canvas. Blaschke et al (2015) argue that, the Strategyzer originates from a proper BM ontology, pointing at the opportunities of a formally sound ground for BM management.

Gordijn & Akkermans (2001) refer to various other business model tools such as the “e3-editor” and “e3-value” models. “E3-editor” converts graphical “e3-value” models into spreadsheets and it is based on the “e3 value” ontology.

Berre, et al (2013) refer to much more novel BM tools such as the NEFFICS platform, which merges an open innovation social media and business modelling platform which is based on the Value Delivery Modelling Language.
(VDML). Bouwman et al (2012) refer to VDML as a basis for VDMbee, a recently developed value delivery management tool.

A very recent example in terms of a strategic move by the Europe’s biggest Low Cost Carriers (LLC), Ryanair which aims to go for long haul flight and collaborate with long-haul airlines including Lufthansa and Air France-KLM within the next 10 years and boost passenger numbers (Financial Time 2016).

Table 6.1. portrays the seven affordances discussed above with the focus on ES features, ostensive aspect of organisational routines, performative aspect and an organisational example. Table 6.2 shows the various functionality of SAP Enterprise Systems and the modules that they cover. SAP NetWeaver Process Orchestration which is considered as one of the novel SAP ES, covers most of the abovementioned functionality (ES Features).

The next section will engage with discussion on the main findings and also the alignment with the conceptual theoretical framework. Overall the main findings of this research in terms of the empirical work will mainly address the second sub-research question in terms of consequence of organisational change and stability.
**ES – Organisations Affordances**

Table 6-1: ES - Organisation Affordances

<table>
<thead>
<tr>
<th>ES Features</th>
<th>Ostensive Aspect of Routines</th>
<th>Performative Aspect of Routines</th>
<th>An Organisational Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES Common Database and Platform</td>
<td>Administrative Roles in Organisations which is considered as part of most jobs</td>
<td>Performing the Task (Scanning, Entering Data in the online forms,)</td>
<td>RFID – Scanning Product Labels</td>
</tr>
<tr>
<td><strong>Affordances 1 – (Constraining – Enabling)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capturing and Recording Data about Customers/Suppliers and Transactions within an Organisation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ES Common Database filled with Structured Organisational Data</td>
<td>Organisational Intranet and Communication System - Email/Messaging/go to meeting</td>
<td>Scheduling an online meeting with staff</td>
<td>Meeting with Sales and Marketing Team through ES intranet, Lync</td>
</tr>
<tr>
<td><strong>Affordances 2 – (Constraining – Enabling)</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Access to Cross-Functional Real Time Information</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>ES Common Database filled with Structured Organisational Data</td>
<td></td>
<td></td>
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<tr>
<td><strong>Affordances 3- (Constraining – Enabling)</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring and Observing Organisational Processes</td>
<td>Audit Role</td>
<td>When an External Audit Company oversee the transaction/processes</td>
<td>KPMG auditing BMW – Financial Manager monitoring the recorded processes to find out the loop holes</td>
</tr>
<tr>
<td><strong>Affordances 4- (Constraining – Enabling)</strong></td>
<td></td>
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</tr>
<tr>
<td>Access to Rich Information for Decision-Making Purposes</td>
<td>“C” level Roles e.g. HR manager, Operation manager, Financial Manager</td>
<td>Personnel Shift Planning, Job Rotation</td>
<td>Line manager cutting number of hours or to increase efficiency</td>
</tr>
<tr>
<td><strong>Affordances 5 – (Enabling)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process Redesign and Improvement</td>
<td>R&amp;D Roles and Routines</td>
<td>Designing an efficient process by R&amp;D team</td>
<td>When R&amp;D team presents a new product blueprint</td>
</tr>
<tr>
<td><strong>Affordances 6 – (Enabling)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Go to Market and Product Design (R&amp;D)</td>
<td>Strategic Management Roles/Routines (Market/Product Analysis and Predictability)</td>
<td>Designing a new product or entering into a new market</td>
<td>Ryanair entering long haul flights</td>
</tr>
<tr>
<td><strong>Affordances 7 – (Enabling)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Model Innovation</td>
<td>Strategic Management roles/routines: Data Analysis Roles, ES Decision Support Features enable various roles in the organisation to expand the area of business by innovative business models</td>
<td></td>
<td>Uber, Airbnb, (Sharing Economy Business Model).</td>
</tr>
</tbody>
</table>

**Decision Support (Collaborative process modelling, Heterogeneous integration, BMIS)**
Table 6-2: SAP Enterprise Systems Functionality

<table>
<thead>
<tr>
<th>Functionality</th>
<th>SAP Business Workflow</th>
<th>SAP NetWeaver BPM</th>
<th>ccBPM</th>
<th>SAP NetWeaver Process Orchestration</th>
</tr>
</thead>
<tbody>
<tr>
<td>User-centric capabilities</td>
<td></td>
<td></td>
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<tr>
<td>Integration-centric capabilities</td>
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<tr>
<td>Heterogeneous integration</td>
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<tr>
<td>End User experience (task inbox)</td>
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<tr>
<td>External consumption and extensibility (API)</td>
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<tr>
<td>Java-based integration</td>
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<tr>
<td>Implementation of task form</td>
<td></td>
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<tr>
<td>Process modelling</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Collaborative process modelling</td>
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<tr>
<td>Leverage SAP Business Suite processes through SAP Solution Manager</td>
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<tr>
<td>Business Rules</td>
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<tr>
<td>Process Monitoring and Analytics</td>
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</tr>
</tbody>
</table>
6.2. Discussion on the Main Findings

The area of concern of this research which has been discussed in detail in chapter one, was narrowed down to one main research question and two sub research questions.

The conceptual theoretical framework in chapter three of this study has been developed based on the concept of change which is enabled by an ES application. It has been discussed in chapter three that the theoretical framework for this research has been methodologically driven by the philosophical consideration of Critical Realism (CR) as a Meta-Theory. Causality in critical realism studies is expressed as mechanisms and hence identifying generative mechanisms is considered as the main focus of CR field studies (Bhaskar 1998, Bygstad et al 2015, Volkoff et al 2013).

Organisational routines as a unit of analysis of organisational change and stability in organisations have been mapped to the stratified ontology of CR. Although by definition organisational change and stability can be explained by the interaction between organisational routine elements, aligning organisational routine elements on stratified ontology of CR, sheds light to understanding the nature of this change and stability in an epistemological sense. The form of inquiry in CR paradigm is considered as retroduction and thus the logic and mode of reasoning and analysis in terms of understanding of change and stability is “Retroduction” in this study.

Retroduction is defined as developing an understanding through a back and forth process of theory to observation and observation to theory (Sudabby 2006). In other words, an understanding of change and stability in organisations is theory laden (Organisational Routine Theory), and this understanding is developed and enhanced by empirical and field work (on materiality of an ES) i.e. by further observation (on the role of technology) and complementing the theory of organisational routine. To be more specific, narrative as representation (interview data) has been used from realist point of view to enrich and explain the conceptual theoretical framework and final narrative plot. The use of “narrative as representative” could effectively explain the nature of change and stability enabled by an ES application through the lens of relational affordances.
It is argued earlier that, causality in CR is depicted identifying generative mechanisms i.e. how phenomena occurred? In this regard, in the next section of this chapter, generative mechanisms for this study will be explained in greater depth.

**Final comments on Conceptual Theoretical Framework**

**Figure 6-1: Conceptual Framework on Enterprise Systems Enabled Organisational Change**

- **Ontology:** Stratified Ontology of CR (Nested Reality; Reality, Actual, Empirical)
- **Methodology:** Narrative Inquiry (Observation on the ES artefacts/features)
- **Theory:** Organisational Routine Theory (Material, Ostensive and Performative)
- **Mode of Inquiry:** Retroduction: Extending Organisational Routine Theory through relational affordances.
- **Epistemology:** Explaining Generative Mechanisms by Mapping Organisational Routine Elements in the Stratified Ontology.

**Objective:** To shed light on organisational change and stability enabled by ES artefact by the conceptual theoretical framework.
The discussion section highlights the consequence of organisational change and stability enabled by ES applications which is the concern of the second sub-research question.

6.2.1 Generative Mechanisms on Organisational Change

It can be argued that “enabling change” and “constraining change” are two main generative mechanisms which are caused by an Enterprise System Application.

In this regard, enabling change and constraining change as two macro generative mechanisms could potentially explain innovation/ transformation and governance/control respectively. For instance, the study by Bygstad (2010), on “how the information infrastructure is generating innovation, and also how the innovations are modifying the information infrastructure” explores innovation and new services reinforcement mechanism as two macro generative mechanisms.

In this study, relational affordances have been confirmed/proved to be a well-balanced conceptual measurement to analyse and understand stability and change in organisations. Based on the interview data (narrative as representations) and analysis, seven interrelated affordances between ES applications [features] and an organisation have been derived (See table 6.1. for the relational affordances). Furthermore, table 6.2. provides various technical features of SAP ES applications which could potentially enable or constrain various organisational change.

It should be noted that various modules are considered as adds-on and would be developed by third parties that work under the umbrella of the parent ES vendor. Vistex (6 Interviews have been conducted with various roles in the company) is one of the third-party companies which works for SAP and develops various add-ons to SAP ES applications.

Affordances one to four (table 6.1) are considered as both constraining and enabling change in organisations, whereas affordances five to seven (table 6.3) are considered as enabling change towards organisational improvement and efficiency. Although an ES application supports the related features, these affordances might not be realised or actualised in practice.
In the next section, two main generative mechanisms (enabling and constraining change) are explained and related affordances will be discussed in further.

6.2.2. ES Enable Organisational Change

Four affordances have been identified which can be considered as enabling change (macro generative mechanism) in organisations. Table 6.3 shows the enabling organisational change which could be afforded from an ES.

As enabling change can be considered as an important concept in today’s competitive environment due to competition and various other macro environment factors, the next two subsections will explore enabling change mechanisms towards innovation and organisational transformation in further from innovation and change literature.

Table 6-3: Enabling Change Generative Mechanism

<table>
<thead>
<tr>
<th>Enabling Change Generative Mechanism (ES – Organisations Affordances)</th>
<th>Ostensive Aspect of Routines</th>
<th>Performative Aspect of Routines</th>
<th>An Organisational Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Affordances 5 – (Enabling Change Generative Mechanism)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process Redesign and Improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compare &amp; Contrast reports and data for various scenarios</td>
<td>R&amp;D Roles and Routines</td>
<td>Designing an efficient process by R&amp;D team</td>
<td>When R&amp;D team presents a new product blueprint</td>
</tr>
<tr>
<td><strong>Affordances 6 – (Enabling Change Generative Mechanism)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Go to Market and Product Design (R&amp;D)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Analytics – Business Intelligence</td>
<td>Strategic Management Roles/Routines (Market/Product Analysis and Predictability)</td>
<td>Designing a new product or entering into a new market</td>
<td>Ryanair entering long haul flights</td>
</tr>
<tr>
<td><strong>Affordances 7 – (Enabling Change Generative Mechanism)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Model Innovation</td>
<td>Strategic Management roles/routines, Data Analysis Roles. ES Decision Support Features enable various roles in the organisation to expand the area of business by innovative business models</td>
<td></td>
<td>Uber, Airbnb. (Sharing Economy Business Model).</td>
</tr>
</tbody>
</table>
6.2.2.1. Innovation and ES Platform

Innovation through IS/IT software packages and ES application is one of the most discussed topics in academia (Melville et al 2004, Chae et al 2014) and in practice (Davenport & Short 1990, McAfee 2006).

Sedera et al (2016) argue that, in the current competitive business environment, organisations are increasingly under pressure to maximise their resources and particularly to enhance the value and benefits embedded in their existing Enterprise Systems (ES).

Gawer (2009) indicates to ES application as the building block and essential platform which support organisational essential functions and processes. Furthermore, Gawe & Cusumano (2012) recognise ES as a dominant corporate technology platform e.g. NetWeaver platform interface by SAP. Ceccagnoli et al (2012), argue that ES technology platform could facilitate an ecosystem of the third party products, services and suppliers.

In terms of innovation and radical change, which link to the ES platform, Gawe & Cusumano (2012) argue that, less restriction and further flexibility in the ES platform contribute to organisational innovation. Other studies argue that ES platforms rigid design could hinder innovation (Kharabe & Lyttinen 2012). Industry practitioners also link inflexibility of ES platform to innovation hindrance and lack of growth opportunities (Davenport 2000).

In relation to the enabling change generative mechanism, and related to affordances, the “ES technology platform” is one of the important aspects of current ES applications in terms of flexibility and design. This is important in terms of the material aspect of technology and to the extent that organisations can afford this feature.

It is argued that an inflexible ES platform could hinder innovation whereas a flexible and shared platform contribute to innovation and change in organisations. One of the recent examples in relational databases and shared platforms is the co-opetition (cooperation – competition) between Oracle and SAP (Troesch & Schikora 2010).
The justification behind collaboration of the two rival ES vendors is to cover more industries and products through a shared platform. It can be argued that this co-opetition would make the ES technology platform more flexible for organisations and hence further affordances could be realised. This flexibility in the ES-technology platform would lead to realisation of further business values and benefits which would result in innovative business models (Chesbrough 2003, 2007)

Another trend which can be mentioned in terms of flexibility in ES platform is open source software (OSS) and Open Source ES. According to Olson et al (2015), open source approach towards ES and software packages enable developers and organisations to revise and embed their unique requirements and give feedback continuously.

6.2.3. ES Constraining - Enabling Organisational Change

Constraining change in ES applications can be defined as further control, transparency and integration in an organisation. It was discussed in the findings of this chapter that organisations adopt ES best-practice as the ES application has been developed for the specific industries or specific products. It was argued that ES application is a must for contemporary organisations and the best practices can be developed by the investment of large organisations with a continuous collaboration of organisations and ES vendors during a long period of time. In order to highlight this issue in further, the next section, integration and control as one of the main objectives of an ES will be discussed with the focus on routine dynamics.

- 6.2.3.1. Integration and Control: Goal of EA Applications

Control and transparency can be considered as one of the important organisational phenomena as it can bring governance, discipline and integration into the organisational structure. Various scholars considered that integration and control as the final goal of ES applications (Gosain 2004, Gattiker & Goodhue 2005, Berente et al 2016).

Berente et al (2016) cited from Barki & Pinsonneault (2005), define organisational integration as “the extent to which distinct and interdependent organisational components constitute a unified whole”. Integration drives
organisational efficiency through further transparency in the business processes and improvement in knowledge sharing (Shang & Seddon 2002, Srivardhana & Pawlowski 2007).

The integration and flow of information and transparency through the central/common database enhances further control and governance in the system which can be linked to relational affordances that is discussed earlier. However organisational integration depends on various external and internal factors. For instance, Berente et al (2016) indicate to data and process standardization, which are enabled by ES application. It is discussed in the findings and the empirical chapter that, ES best practices contribute to smooth implementation. Academics and practitioners regard ES best practices [for instance ERP application] as powerful instruments in managerial level to control and govern (Kallinikos 2004, Gosain 2004, Elmes et al. 2005).

In this regard and in correspondence with constraining change generative mechanisms, control and integration are two important elements which organisations demand from ES application to survive in the competitive market. Berente et al (2016) in terms of an effective objective of an ES with reference to control and process structuring, indicate to the close link between organisational wider strategy and enterprise system adoption and implementation.

Davenport as one of the most cited literature on Enterprise Systems, associates ERP applications with the pursuit of centralized control to enforce strict standards of operation (Davenport 1998). Furthermore, Elmes et al (2005) point to the real-time enterprise-wide monitoring which associated with control and transparency in the organisations.

According to Berente et al (2016), integration and control are considered to be mutually reinforcing, but achieving either can be elusive. They also indicate to misalignments in the organisational routine dimensions which can hinder integration and control (Boudreau & Robey 2005, Strong & Volkoff 2010, Berente & Yoo 2012).

In the next section, organisational routines misalignment will be discussed in further.
6.2.3.2 Routines and Misalignment

It was discussed in the theoretical underpinning of the research that an ES artefact [as a material dimension of the routines] interacts with both performative aspect and ostensive aspect. However an effective ES artefact needs to be aligned properly with organisational routine elements.

Berente et al (2016) argue that, actors at all levels in organisations (in terms of the embodied roles and routines) need to conduct their work in accordance with general organisational principles align with ES artefact principles. They argue that misaligned ES do not support activities of local participants, or they impose additional burdens on those users through differences in rules, data, or both. Misalignments between organisations and ES could be manifested as technical failures (Wei et al. 2005) and consequently incompatible business standards (Davenport 1998), and they can result from deeply engrained tensions, such as conflicting epistemic cultures (Wagner & Newell 2004).

In organisational context, misalignment would be posed as value conflicts (Allen 2005), power struggles (Scott and Wagner 2003), or clashes between institutional logics (Gosain 2004, Sia & Soh 2007, Berente & Yoo 2012).

Berente et al (2016) argue that misalignments are the barriers and need to be overcome in order to achieve the integration and control associated with ES applications (Soh et al. 2003, Strong & Volkoff 2010).

ES best practices and newly implemented ES by organisations rarely align perfectly with existing routines as ES best practices are considered generic template in an industry and seldom fit with local routines of an organisation (Leonard-Barton 1988, Markus & Tanis 2000, Berente et al 2016, Wagner et al. 2006).

Strong & Volkoff (2010) argue that gaps between organisational requirements as manifested in the system and existing user routines lead to misalignment and consequently implementation problems.

In an ES implementation, misalignments between organisations and ES artefact features need to be mitigated which demand long term mutual adaptation between the system and routines. This mutual adaptation should

According to Berente et al (2016), misalignments are developed by a combination of the pre-existing situation, the interpretations and actions of individuals, and the technical elements of the system. Achieving integration and control, requires sets of changes either to the ES artefacts or local routines that can eventually lead to alignment, but may also lead to persistent misalignments (Wei et al. 2005, Light & Wagner 2006, Sia & Soh 2007).

Lyytinen & Newman (2008) argue that, in order to successfully bring about the desired integration and control, a kind of sociotechnical equilibrium is expected. Berente et al (2016) argue that, without the balanced state and/or sociotechnical equilibrium, there would be a system related drift away from the original expectations of the system implementation and new misalignments between ES objectives and local user routines, trigger unpredictable activity by users who seek to avoid being controlled (Ciborra 2000).

6.3. Summary

This chapter has provided the main findings of the research under the concept of relational affordances. Two main generative mechanisms as enabling change and stability by ES application have been explored. At the end, innovation and change with respect to ES platform, and integration and control as the main objective of an ES application in organisations have been explored in further. Alignment between an ES application and organisational routine proved to be a desired socio-technical equilibrium which is sought by organisations and ES designers which contributes to further control and governance in organisations.


7. **CHAPTER SEVEN – CONCLUSION**

**7.0. Introduction**

The final chapter of this study endeavours to bring together the conclusion and recommendations of this research. The first section of this chapter will have an overview of the summary of the main findings which have been discussed in details in chapter five and six. The second section of this chapter will address the contribution of this research in three main domains of knowledge i.e. theoretical, methodological and practical contributions. The limitation of this study and further research will shed light on the potential research on organisational change and stability which is enabled by IS/IT technology in general and Enterprise System artefacts in particular.
7.1. Summary of the Main Findings

The researcher, after careful consideration of the entire research process and the various interviewees’ recommendations and the main supervisor’s comments, summarizes the main findings of this research as follows;

- Adopting an Enterprise System artefact (Technology) in an organisation (Social Settings) is considered as a sociomaterial assemblage (Orlikowski 2007), in a sense that two sides cannot be considered separable. This is important in the research context in terms of adopting theoretical and methodological considerations. It is argued in-depth in this research that those theories that are focused on organisations, such as social constructivist theories (for instance structuration theory), or focused on technology, such as institutional theory, cannot provide researchers with a holistic understanding on technology enabled organisational change.

- In this regard the conceptual theoretical framework (Chapter 3) which has been developed (addressing the main Research Question) can provide deeper understanding of organisational change and stability which is enabled by technology in a broader sense (Research Aim) and Enterprise System applications in particular.

- This research has addressed the research gap (which is the concern of academics in IT and organisational change from 2006 onwards) by focusing on the material aspect of technology in a broader sense and Enterprise System application features in particular in order to highlight the objective, realist and non-mentalist nature of technology. In particular, this research has been underpinned by philosophical considerations of Critical Realism which has received significant attention in IS/IT research (Dobson 2001; Mingers 2004a, 2004b; Smith 2006, Volkoff et al. 2007, Strong & Volkoff 2010, Mutch 2010, Bygstad 2010, Wynne & Williams 2012 Volkoff & Strong 2013, Mutch 2013, Mingers 2014, Bygstad et al 2015).

- Organisational routines are considered as a unit of analysis of organisational change and stability (Feldman & Pentland 2003). ES artefact as a material aspect [technology] which plays an important role in organisational change and stability and consequently in the dynamics of organisational routines, has been positioned in the centre of routines
rather than peripheral (D'Adderio 2008, 2011). In other words, ES application enables performative dimension of routines (see the conceptual theoretical framework) to change, organise and perform. ES [the material aspect of routine] can also shape and support the ostensive aspect of routine which interacts closely with the performative dimension. (Addressing the first sub Research Question).

- This research has addressed the research gap by considering the concept of affordances from ecological psychology (Gibson 1977, 1979) as an analogy of animal-environment system to man-machine system. The relational approach (Stoffregen 2003) towards affordances (the relationship between an ES and an Organisation) has been proved and justified to be a well-balanced unit of analysis to understand change and stability.

- The empirical work which has been done through a narrative research strategy and data collection from ES designers, architects and business developments (narrative as representation) (Chapter 5) by the justification that ES vendors have holistic understanding of the ES artefacts [in terms of features] and also have holistic understanding [through experience of implementing and designing in various organisations] on organisational needs and requirements.

- The conceptual theoretical framework of this research has been built on philosophical underpinnings of Critical Realism. Dimensions of organisational routines have been mapped in the stratified ontology of CR. In CR driven field studies the important element in explaining and understanding [Area of Concern] is identifying and exploring generative mechanisms [Epistemology] through the logic of “Retroduction”. In this regard two main generative mechanisms, “Enabling Organisational Change” and “Constraining Organisational Change” by an Enterprise System, have been identified.

- In order to explain generative mechanisms, this research has carefully aligned the concept of “Affordances” with generative mechanisms (Volkoff & Strong 2013). Seven relational affordances (Chapter 6, table 6.1) have been identified by the focus on ES features and organisations, which can effectively explain generative mechanisms and
consequently, ES applications enable and constrain organisational change (Addressing the Second sub Research Question).

- Innovation considering ES Platform and Integration and Control as one of the main objectives of ES applications has been discussed through the lens of generative mechanisms and organisational routine dynamics.

7.2. Research Contribution

This research provides further insights on three main domains of knowledge, namely; theoretical, methodological and practical. (A) The area of concern of this research (Chapter 1) has been viewed with (M) methodological lens of CR (Chapter 4) by adopting extended organisational routine theory (Chapter 2 & 3). In this regard the received feedback from the “Area of Concern” and the “Methodological” components would define theoretical contributions and consequently the received feedback from the “Methodological” and “Theoretical Framework” would define practical contributions. The received feedback from “Area of Concern” and “Theoretical Framework” components would define the methodological contribution of this research.

7.3. Theoretical Contribution

The main theoretical contribution of this research is the development of the conceptual theoretical framework which explains change and stability in organisations enabled by an Enterprise System application with a holistic lens of relational affordances.

It is argued in the literature gap that theories which adopt affordances and are based on the social constructivist approach tend to consider material reality to endless interpretation and consequently disregard the physical constraints imposed by material objects (ES artefact in this research) (Hutchby 2001). Adopting those theories using institutional theory tend to ignore agency (organisations’ needs and contexts), and IT technology (ES artefact) is often considered as a concrete object, ignoring each ES application features and distinctive characteristics.

Volkoff et al (2007) argue that, framing the change approach that is enabled by IS/IT technology (ES Artefact) is more of a theoretical and hence methodological problem. It is argued in detail in (chapter 3) on the interplay
of theory and method in which they are intertwined and intermingle. *(Chapter 3 presents a detailed argument on the interplay of theory and method and how they intertwine and intermingle).* As Weick (1989) puts it, theory construction is hemmed in by methodological paradigms. Furthermore, Van maanen et al (2007) stated that, method can spawn as well as shape theory boundaries and vice versa. In this back-and-forth process, concepts and data are in continuous interaction and development.

The conceptual theoretical framework of this research has been developed by wider methodological and philosophical considerations of Critical Realism (CR) as a Meta-Theory.

Positioning the elements of “Extended Organisational Routine Theory” (Ostensive, Performative and Material) on stratified ontology of CR and exploring the generative mechanisms (Enabling and Constraining Change) on routine elements through “relational affordances” (Relationship between ES artefact features and Originations) is the main theoretical contribution of this research.

The following section portrays the methodological contribution of this research which, as mentioned earlier, is intertwined with the theoretical consideration of this research.

### 7.4. Methodological Contribution

The research onion framework in chapter 4 (Figure 4.1) depicts the overall methodological consideration for conducting this research.

Adopting Critical Realism as the main philosophy (the outer layer of the research onion framework) influences other methodological components significantly. Critical Realism, due to its stratified ontology, can capture broader dimensions of reality *(Area of Concern)* and consequently the nature of change. According to Strong & Volkoff (2010), causality is not deterministic as in institutional theory which was explored in literature gap. However, real entities are assumed to have causal effects. In other words the material aspect of technology (entities in CR vocabulary) on their own and/or in combination with other rules and routines cause/generate effects through generative mechanisms. This is consistent with the CR approach towards
change. As Archer (1995) argues, the entities (materiality) have existed before the process of change (events), however; the events/changes might lead to subsequent transformation in the materiality/technology (entities).

These two definitions of critical realism i.e. the stratified ontology and the horizontal stratification (materiality of enterprise systems/entities), exist before the change process and fit well with the methodological consideration for this research. This has been supported by novel studies in which the theoretical framework of this research has been developed (Strong & Volkoff 2010, Volkoff & Strong 2013).

The summary of methodological contributions for this research could be considered as follows;

- Positioning and justifying various elements of extended organisational routine theory on stratified ontology of CR and exploring the dynamics of organisational routines by the logic of retroduction in an epistemological sense. Retroduction in terms of theory consideration is defined as; “Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory (Sudabby 2006).” Organisational Routine Theory has been revised/extended by empirical work and narrative inquiry [observation] throughout the process of the research. The empirical work has justified the relational affordances between Enterprise System Features and Organisations and is a well-balanced unit of analysis for exploring organisational change and stability enabled by an Enterprise System application.

- This study has justified that “Narrative Inquiry” is a solid research strategy which enables researchers to explore organisational change and stability in a well-balanced way in comparison with other research strategies. To be more specific, interview data has been used as “narrative as representation” from a realist point of view in the narrative inquiry process. In this regard, the story teller [researcher], constructed a plot [story] through the process of field work and conceptual theoretical framework. The data, has been collected from ES Vendors, designers and architects (narrative as representations) who are believed
to have access to a more holistic information about the material aspect of technology [ES features]. The “narrative as representation”, enriches the narrative plot and explains the conceptual theoretical framework and consequently organisational change and stability enabled by an ES application in further detail by practical examples.

- This research has adopted qualitative approach as the choice of the research method. Although Bhaskar didn’t introduce any specific research method for conducting research, various researchers in IS/IT tend to adopt mixed-method research strategies, however this research justifies that a single choice (qualitative research method) would be further effective. The rationale behind the qualitative method is that the materiality of the technology [ES artefact] is designed and developed by social agents [Enterprise System Vendors] with a socio-technical worldview. Narrative inquiry through semi-structured interviews in a qualitative sense could potentially reveal insights to the nature of change. Whereas quantitative research and/or mixed-method research based on objective understanding of ES features, would not reveal the subjective nature of socio-technical phenomena.

- Overall the combination of the research methodology components and the choice of data collection and fieldwork (Enterprise Designers) are unique in exploring technology enabled organisational change research and literature.

7.5. Practical Contribution

This section discusses the practical contribution of this research to the body of knowledge in Enterprise System applications in terms of features and design. In accordance with the F – M – A of the research, which has been explored in chapter one, the combination of the received feedback loops from the methodology and the theoretical framework of this research depicts the practical contribution which has been explored in the findings and discussion chapter. The findings of this research portray that the well-balanced approach towards understanding generative mechanisms (enabling and constraining change) by ES applications can be seen through the lens of relational affordances. Furthermore, as the data collection of this research has been
gathered from ES designers to identify the ES application features, it could potentially prescribe practice in terms of ES design.

Certain features of an ES application could enable organisational change which leads to innovation and enhances organisational competitive advantage i.e. Business Analytics, Decision Support Feature and Shared Platform. Relevant relational affordances could inform ES designers in a holistic way on potential innovation and changes that ES application could bring to organisations and consequently ES vendors may develop the ES applications accordingly.

7.6. Limitation of the study

This research has studied the process and nature of change which is enabled by Enterprise System applications. In order to respond to the research gap in IT and social organising literature, which focuses on the material aspect of technology, the main source of data has been considered from ES designers and architects and mainly from ES vendors. Although every effort has been made to access information from professionals from the ES vendor side, for instance designing semi-structured interview as a guide (derived from the conceptual theoretical framework), the process of interviews has been very demanding and time consuming and the following points could be considered as research constraints;

- Although ES vendors and consequently ES designers/architects have a holistic understanding of the majority of industries and organisational needs and requirements, in reality, various soft aspects of business, for instance politics (in terms of lobbying), vendor competition, monopoly of ES vendors etc. might affect adoption of specific ES application from top ES vendors. In other words, selection of particular ES software from an ES vendor might not necessarily match organisational needs and requirements and consequently can hinder the process of change and potential perceived benefits that an organisation can achieve.

- The information collected from the ES designers, architects etc. might be biased towards the wider policy of the ES vendors that they are working for. In this regard the worldview of ES designers could be developed based on wider strategic goals of the ES vendors and might not necessarily reflect a smooth and well-balanced socio-technical system.
design which is aligned with every stakeholder in the adopting organisations.

- The developed conceptual framework for this research can explain change and stability through the concept of relational affordances. In this regard and following the abovementioned points there could be considered various other relational affordances on future research which will be outlined in the next section.

- This research has used “Narrative Inquiry” as the main research strategy and “Qualitative Research” as the choice of research method. Although, Bhaskar didn’t introduce any specific method for conducting research under Critical Realism approach, however various researches have been done through an eclectic approach i.e. multi-method & mixed method (qualitative & quantitative). Furthermore as the research in IS/IT is developing under Critical Realism approach, it is suggested that future research in this area focuses on the choice of research method and strategy in an eclectic way which can effectively identify and explore the interaction of generative mechanisms in an open system perspectives.

### 7.7. Future Research

It is mentioned in the methodology chapter that the philosophy of Critical Realism is considered as a philosophy of “Underlabourer”. Bhaskar (1975) states that “it is the job of substantive science to discover which mechanisms actually exist”. The “underlabourer” concept can be aligned with the empirical corroboration concept in a sense that science needs to explore various alternative ways of explanation and causal mechanism which make sense in stratified ontology through time.

Aligned with the “Underlabourer” concept of CR, it could be perceived that future research should focus on exploring other mechanisms and in relation to this study, further relational affordances which can explain change and stability in further detail.

With advancement of IS/IT and consequently Enterprise System applications to more advanced Enterprise Solutions, for instance mobile cloud computing and artificial intelligence, there will be further relational affordances which can be perceived based on both sides. In other words, organisations will develop
more complicated and advanced requirements based on the context of their business and industry competition and accordingly organisations (social side) demand more sophisticated IS/IT and Enterprise Business Solutions.

As CR is considered as Meta-Theory and can capture organisational routine elements in a justified and well-balanced way and also can explain change and stability based on the relational affordances, the author suggests that future research should focus on identifying relational affordances based on future organisational requirements and activities and enterprise business solution features.

In terms of methodological consideration, particularly the implementation of research, it is suggested that research can be conducted with an “Action Research” research strategy in ES vendors. The rationale behind conducting the “Action Research” research strategy in ES Vendors would be perceiving the real benefits and changes and learning through feedback from various stakeholders, and to reflect on the learning in an ES artefact in a well-balanced way.

7.8. Concluding Thought

The purpose of this study was to explore change and stability which is enabled by an ES application. This research has justified the focus of the research (focusing on the materiality of technology) by addressing the research gap. The findings have portrayed that, in order to understand change and stability in organisations, research should capture the “Area of Concern” with a wider methodological and theoretical lens. The conceptual theoretical framework of this research which has been developed by the wider lens of Critical Realism as a Meta-Theory and organisational routine theory (as overarching theory which could explain change and stability) depicts that “Relational Affordances” could be a well-balanced unit of analysis for exploring change and stability in the organisations which are enabled by ES applications.

This research has shown its potential contributions in various domains of knowledge which are overlapping and intertwined.

Finally, limitations of this research and some constraints have been identified and the future roadmap for pursuing research in organisational change and
stability by IS/IT software has been stated by the justification of the Critical Realism “Underlabourer” concept.
REFERENCES


Seddon, P., Calvert, C., & Yang, S (2010). MIS Q. A multi-project model of key factors affecting organisational benefits from enterprise systems. 34(2), 305–325


Appendix A. Information Sheet for Interviews

Information sheet for research conducted by Sohrab Moshiri

**Topic of the Study:**

*Enterprise System Enabled Organisational Change; A Qualitative Critical Realist Approach on Organisational Routine Dynamics*

**Purpose of the Research**

I am conducting this research as part of my PhD programme at Manchester Business School. This research lies in the context of organisational change theory and it is aimed at constructing a well-balanced theoretical and methodological underpinning to study “Technology Enabled Organisational Change” in a broader level and view this change with a holistic methodological lens. In particular this research has the following objectives:

- Exploring Enterprise system applications features and capabilities
- Exploring the relationship between ES features and organisational requirements and needs
- Shed light to deeper understanding of organisational change with relational approach towards affordances

**Process**

The data will be collected using semi-structured interviews. The researcher will conduct the interviews on a one-to-one basis and at a mutually convenient time. The interviews will take place 1.5 – 2 hour. The interviews will be audio recorded and will be transcript.

**Consent and Feedback**

The notes and information will not be shared with anyone besides the researcher and my supervisor.

**Analysis**

I understand that I will read and comment on Sohrab’s transcript of the interview and can change or amend the transcript in consultation with him. All the transcripts will be emailed by me for their review to the various participating interviewees if they so desire.

**Please contact me at any time regarding any aspect of this research**

Regards,

Sohrab Moshiri
Appendix B. Consent Form

Title of the Research: Enterprise Systems Enabled Organisational Change

Many thanks for your time and letting me know your professional comments and feedback regarding the subject of my thesis. Your comments and your participation in this interview are highly appreciated. This interview is a part of a research study and exploring the changes which bring to organisations by IS/IT software packages and broadly speaking Enterprise System Applications.

The objective of this research study is to identify and explore the nature of Enterprise System applications and how these ES applications transform organisational processes and make them more efficient and effective.

I want to make it clear that any names that will be gathered from this interview will be changed and all information gathered throughout the interview will be kept confidential. Please read and sign the statement below.

Please tick if applicable:

- I confirm that I have read and understood the information sheet provided.
- I agree to take part in the case study research.
- I agree to the interview being tape recorded.
- I agree that the interview materials can be supplied to external entities for academic purposes under the condition that my identity will remain anonymous.
- I grant my permission to the researcher to literally use my own words in his thesis under the condition that my identity will remain anonymous.

Name of Participant:

Date: 
Signature: __________

Name of Researcher: Sohrab Moshiri
Date: 
Signature: __________
### Appendix C. Interviewees Profile

<table>
<thead>
<tr>
<th>No.</th>
<th>Company and/or ES Vendor</th>
<th>Role</th>
<th>Number of Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SAP Partner</td>
<td>Enterprise Architect</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>SAP Partner</td>
<td>Chief Information Officer (CIO)</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>SAP Partner</td>
<td>Business Development</td>
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<td>SAP Partner</td>
<td>System Analyst and Programmer</td>
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</tr>
<tr>
<td>5</td>
<td>IBM Partner</td>
<td>Enterprise Architect</td>
<td>3</td>
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<tr>
<td>6</td>
<td>Oracle Partner on Enterprise and Cloud Applications</td>
<td>Enterprise Architect</td>
<td>3</td>
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<tr>
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<td>Data Analyst/Programmer</td>
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</tr>
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<td>Independent ERP Consultant</td>
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</tr>
<tr>
<td>9</td>
<td>Independent System Designer (Academic)</td>
<td>Academic Role in Technology and Organisation Studies</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Number of Interviews: 21**
Appendix D. Interview Questions

Interview guide

- Can you please state your name and position in this department? How long have you been with this organisation?

- Do you have any prior experience in system design?

- What role are you playing in this enterprise systems design? Are you a member of any committee relating to the system project?

- What are your main responsibilities, activities and interaction with other teams within the company?

- In your opinion, what is the reason for the implementation of the enterprise system?

- Which companies are your main customers, client and which sector or industry or in terms of size (SMEs, large corporation) are you working with?

- What are the requirements of the customers/clients? (What do they want to achieve by adopting an ES) i.e. Do customers have some requirements and you embed those requirements on the system/application? Trevor’s View: Are you observing the main activities in the company or the customers give you their package of requirements?

- In your opinion, what do you think are the most important characteristic/features of the enterprise system application that helps organisations and employees to organise their work? What do you perceive as the benefits/advantages of an IS/IT software packages like an ES? Can you specify some of the products’ functionalities in terms of embedded roles, or work routines, role definition and their relationship for instance a tab is attached to a role etc.

- Based on your experience, do you design generic software packages and organisations customise it based on their unique functions, routines and requirements? Or, do you take part in customising business processes in the organisations based on the features of the ES and re-engineer the processes of both ES and the targeted organisations?

- Who are you dealing with i.e. what are the role of these people in client’s companies, in terms of consulting about your products i.e. CIOs, C level management, Change management team, Business Development teams and BPM teams etc.

- What do you think are the most critical/challenging parts of this ERP system implementation? What strategies have you established/developed for meeting these challenges?

- Are you judging or interpreting a working ES based on your previous implementation/best practices in different companies?

- What are the current business models in terms of upgrading and updating an ES? Does it mean that the companies’ requirements change or need to be revised? Based on your experience how often they need to upgrade their system, yearly, monthly, seasonal etc. for example SAP R/3 has been in the market for quite sometimes and then they changed to a new technology i.e. SAP Hanna
Appendix E. Sample of Interviews’ Transcripts

Enterprise Systems Enabled Organisational Change;
(Enterprise Systems Designers, Enterprise Architect View)

Q: What is the company that you are working for and what is your main role in the Company?

I work for IBM (in the software group division of IBM) and within software group I work in product development team. (The product called Maximo). My role is essentially product development and I work in a group within product development called design and architecture for smarter infrastructure. In our design and architecture group we sort of the mix of customer facing and development team facing, we have a connection (we are a development team and not sales people), and we got quite deep knowledge about products in our domains. We tend to be in sales situation a lot (I work a lot with the sales team). It is very interesting in the past several months; my role is 30 percent of developing and 70 percent sales as it is kind of mix to sell the right product (developing), so I have got a quite strong customer perspective. We have developers, other sort of architects, information developer translation team, (A very big virtual team that build software). The architect tends to be the common thread and have the sort of technical leadership of the team to develop a product. And we are also have the customer facing of the product i.e. gathering requirements, working internally with the IBM product strategy teams, sales teams, What should be built and when and what goes to the market and then coming up with effectively the designs and classification of what we gonna build. It is quite interesting in IBM, because you have that customer facing role and you have the responsibility to go ahead and build it with our development hat on; which I quite like, I like the mixing of the creative roles and design responsibility and leadership hat team.

Q: I think this is the must, because if you don’t know what customers need/want then you cannot develop and it should be a mix between developers’ understanding and customers’ need/understanding

R: Yes, I always think of this and sometimes when I am busy with a very big demonstration to a customer in Sweden and working in the weekend, simply somebody ask me a question with email can be of help ... and I knew that is sort of pressure and it takes time and makes me away from other developing things. You have to recognise those situation, for me it was not a routine situation, as customer was using the product slightly differently, so you need to recognise the learning
opportunity and sales opportunity …. When you are working on a quite a difficult opportunity, you have been creative in how you show the product, developing, extension of the product ... it is a big big learning opportunity as well and you have to recognise that interaction is learning all the time. I think it is amazing, I have seen this quite a bit how introspective some developing teams are awuh, within my company I see these quite a bit because there are a mix of people which are sort of middle aware of IT infrastructure teams and teams like myself which has been relatively deal with IBM which is around business process focus and you are fresh strongly interacting with customers, but we sort of have a history of a team I worked with we were required by IBM about 7 years ago but before that everything was very customer focus and we kept that.

Q: Does it mean, you worked for IBM for 7 years?

R: Well, I have been working for IBM for 7 years, and I started my career as an engineer as apprenticeship and went to university with British airspace, I spent 10 years in British airspace and working on aircraft control system design (fascinating period) and I worked with many great engineers. Digital Control system. and I did MSc in electronic engineering part. Then I went to work in a company that their main business was in utility, and they did quite a bit a of work on oil and gas plant on utility system power generation, so I sort of started to work in oil and gas customers through working on power generation systems on oil and gas plant and I became the sort of engineering manager in that company for oil and gas which is mainly real time systems, real time control supervising systems (gas systems), and the main expertise was on systems and involves a quite heavy project management work, and then I moved to Middle East to set up and new oil and gas division for the company, again mainly focus on system engineering, and while I was there the company was taken over. I always wanted to work with software but never worked before for a software vendor.

While I was in oil and gas company, I've seen software for oil gas as part of evaluation at power station systems called Maximo and it was interesting because it goes back to your point about flexibility of computer systems (I have been working in a world of real time systems) where things weren’t very flexible (they are great systems) but if you had the primary identifier of target or control systems if the description doesn’t match on the instrument you cut it back, so I have this side job as the evaluation of power station. In terms of Maximo, the interesting this was it was quite flexible. I ended up working in software company 15 years ago (Software Product Development) – the last 7 years for IBM, before that I was system based
software, so I guess I have a fairly wide perspective and worked with various sort of companies i.e. power companies, and few different industries like chemical.

Comment: In terms of my track record, I have been working with the same product for 15 years

Q: What are you main responsibilities, activities and interaction in the company?

I worked with multiple different enterprise products like SPSS, Statistics, Optimisation, WebSphere, BPM and you are in a wide world of analytics and systems that can interact with Maximo. Maximo is sort of developed ... as IBM smarter plan initiative. In terms of system, Maximo is system of managing your physical assets, operation and safety. So there is a need to interact with those systems. In my world (Enterprise Architecture) there isn’t such a thing as ERP, it is Enterprise System and actually SAP is one the many Enterprise Systems and working in this environment means you always interact with a group of different systems. And interacting with customers at many different levels, so often people are practitioners, maintenance technician, or at C level management, CIOs, and never so much with financial people, but its all people and I think the good part of it is this. And I think the important part of designing systems, is you got a viewpoint from the ground up from users (in terms of usability) i.e. You need multiple different views. In terms of my role, I am often supporting the implementation team and giving advice or sometimes we are working together for the services, software and the whole thing (We work with Accenture, KPMG)

Q: Which Companies are your main customers, client and which sector or industry or in terms of size (SMEs, large corporation) are you working with?

R: I am responsible for 2 products, one is for Oil & Gas and petrochemicals market the product called Maximo. And I am responsible for another product called Maximo HAC Manager (For Health & Safety), basically we are developing a lot of capability into our oil and gas products. It might be quite generic, as we saw a trend that Non-oil & Gas customers buy our products for health & Safety capabilities so that has been developed for lots of opportunity here and it gets so far and some of our salesforce and some customers e.g. I have had transportation customers in oil and gas, packaging and sales people be quite in particular I can’t go into oil and gas

But there was a natural inhibitor, because of the product’s name, so we said we actually got a basis of something which is wider so we actually developed another product based on oil and gas product with a common code base and marketed through the HSE manager (Health & Safety). So we have already started to deal with
customers in say utility market and mainly utility but manufacturing customers as well.

I would say the strongest sectors are Power generation, water utilities, general manufacturing i.e. it is quite wide range.

Q: Is it because of the performance or function of the products (for instance about Health & Safety which is designed for oil & gas) and some other companies interested in the product because it has the health and safety capability

R: Yes, because it has that capability I think for me, Go design, I would say in principle is for building a flexible system which is what we were trying to do with Maximo quite generic. Don’t make things specific with specific terminology, try just to build generically with common processes so it is very easy to get led by a particular customer, you have to call something quite specific, but we are going for common name which is quite generic. So actually in health & Safety, there is not much in health and safety which is quite specific in oil & gas i.e. there are 1 or 2 standards but not many and you can avoid specific use of those standards. So although we have been making for an oil and gas market, we deliberately didn’t make it for oil and gas unless we had to. So you see it is just a few little areas where we have done that and I think, I cannot think of occasions where we really lost out by customers. It is very tempting sometimes to be quite specific to a particular sector but you start to limit the possibilities of the design. It is much better to have a viewpoint on (I don't to make specific)

Q: Is it like the platform is generic and/or for some companies is customised

R: Yeah, what we have done, there is a generic Maximo platform (several 100 applications in Maximo) in terms of table, size it is quite a big systems not big as SAP but it is big Enterprise System. So there is Maximo platform and what we did about 8, 9 years ago we decided in certain industries to build on (Oil & Gas, Transportation, Nuclear) but what we specifically. It is target oil and gas, because there some sort of capabilities that oil & gas customers might need and we mentioned Oil & gas Product in the brochure (O&G). and just one table is very industry specific and widely used in the sector. Again it is subset for specific industry and we tried not to make it industry specific.

Q: Who are you dealing with i.e. What are the role of these people in clients company, in terms of consulting about your products i.e. CIOS C level management.

R: We interact with change management team, usually we are supporting sales more than, so there is like a our interaction is often sales situation and the other interaction
is more (we have got advisor; councillors) for our products and then development partnership where its existing customers who wants to work with in more details to development products. The advisory councillors around strategy, so that would be C level IT people but also senior domain expert. So it is very important, what people know is none important than their title in the development of the product. Senior Advisor, Senior Engineer, IT manager, Vice president for IT, Mix of different people. So it is mix of IT and business, some companies use IT as a barrier.

Advisory Council for Strategy, development partnership, Sales Contact, online request enhancement system, support queries, and then the sales situation themselves. That is the skill of making software i.e. importing different point of view, stakeholders, wide range of customers as possible, like oil and gas you have got different sectors (Upstream, Downstream, Midstream) if you develop a software for Oil and Gas then it became very big market, and we deliberately didn’t do and we started of thinking wider HSE capabilities and that’s what we have been doing now that bringing people from different industries and people from different set of expertise to build more generic application. So we really work and engagement and drive of customers.

Q: What are the requirements of the customers/clients? Customers have got some requirements and you embed those requirements on the systems/application?
Trevor’s View: Are you observing the main activities in the company or the customers give you their package of requirements?

R: That’s quite an interesting point, and I think there is a lot of in observation on what customers are doing. Sometimes customers say that we have got this existing systems e.g. Manual System/Legacy and Old System and in terms of confidentiality and we should be very careful about the confidentiality. When you are looking at gathering requirements and you got existing systems you really need to consider confidentiality, because it is quite a big issue and we train very carefully to respect IP (Intellectual Property), so when requirements are coming in, making sure it is not another customers IP, in terms of documentation and because they give you a package stuff and you have to watch that a little bit. But you need to know how they use these systems and you need to watch them and engage, it is not OK to have the competitors user manual (Which is confidential), watching them using that system in practice and how they work with it and seeing an example and show you a some screens, so that’s more activity focus. Sometimes customers have spare core, they have an existing systems that they want to replace or we wanted to do this. But in my experience is generally not very structured and I think you also can – I think there is fair amount of observation in the process, there is also so many information but you
always filtering it. Sometimes you are observing what people talk about in a meeting. You observe a lot by functional requirements of and specification of, the most formal source of information, probably when customers come out with a request of a proposal and they have detailed stuff of this requirements.

If you talk with existing customers, it is often not written down formally. If I ask them about specific things e.g. what you do for this process, they might get back to us that we do this, we do that. It is very variable among different customers. I think there is something in terms of what the customers is doing and interpreting it and that is the software building skill sort of trying to pick up things and I think also you probably the software builders we see a whole range what customers do with it. In a way what we trying to do collate whole series of best practices and combination of best practices.

Q: In terms of observation, Are you judging or interpreting based on your previous implementation/best practices in different companies?

R: Yeah, We tend to speak with so many customers and we develop the skill in long period of time. It depends on the culture. I think you get the most things by interaction with the customers directly rather than telephone, internet. You can understand customers when you sit and talk together in a real setting.

Q: is the requirement or activity so much different for various companies and industries or you have got a generic framework and customised easily with the customers requirement? For instance, you mentioned about working for IKEA, is IKEA business processes/requirement so much different with Oil/Gas sector.

R: When we go to that situation we look at the requirements, we adapted it and we spent several weeks to tune it, the software design need to be flexible so we you present it, you have to present it in a right way for the customer, and I think it many cases it depends on the culture of the customer.

So if you take IKEA example, managing a product defect isn't that different from the equipment defect, you know in Oil and Gas Company, there are some differences, but fundamentally if you try or if you make something generic, make generic and if it needs to be industry specific then you do it when you need to it. So the IKEA things, went really well and it is not always the case and we have generally positive reactions but you know it is not always go well, but it also the culture of customer that what they want to do. I had an experience with a German company, (Multinational Company) and we worked with the German division of the company who is using our products and still using our products, the German division doesn't,
so with Maximo we deliberately flexible and it is in its heart and it can adapt to the customer business process. You have got common processes which are flexible. The danger of that it is, you have got an existing system and you want to replace with an Enterprise System and then you want to effectively rebuilt of what you had already. Maximo flexibility does not allow you to do that, but eventually that’s quite a bit of work, and it is not just the work to configure it, you know if you change the name of something unnecessarily, cause you can change labels very easily e.g. tabs and tables etc. very powerful application, so we built it to be powerful, so you can recreate existing system.

So our configuration tools, which makes it harder, if the customer says, these are the requirements and this is what we want to do and they just gonna go, do it, in some ways no stop can be done, but it is sort of failure in a way, because everything is going to be stretched and the whole implementation gets more difficult, this is the discussion we had with IKEA.

When you have got flexible system with Maximo I sort of would say to them, use the power of it, and try and just work with standard way you can and don’t set out that users can get everything that they want, because they may be a better way of doing things, the various way they may change. Find out the areas that they cannot change and the process has to be followed, then use the flexibility in the system to facilitate that change, and we enforce processes that are good processes. If you start with pandoras box right, everything is changeable, but it is part of it, part of the culture of the company. I think Maximo is quite liquid, you don’t see many implementation that go wrong. When you do see them, it goes wrong, it almost, always those who started out with Pandoras Box, we do what we want and we gonna replicate the existing system, it could be done, but it is quite painful. I think definitely use the power of the system and just where (use as much as you can), and then when you need to change something when is flexible and go for that and focus on it. And I think that’s a good practice. So the case of German company, where German division, they have been just setting mind they won’t gonna change. I remember when I have been there, most people are friendly and likeable, and actually delayed (by snow in Frankfurt Airport in the hotel), I just stop there go early morning straight to the workshop, and they didn’t wanna change and carried out with their legacy systems. So maybe that’s good for them, if that’s what they wanted. So obviously the don’t get the benefit of an actual Enterprise System and Legacy Systems has got its own issues, because it hasn’t been architected from the ground up.

Q: Is it more like failure in design i.e. Information System Design from the scratch?
R: I think, it is the failure in the information and system design from the customer perspective. I think it is failure to start with a philosophy that is sort of change everything you want, so the design of the system is not making the best use of commercial off the shelf software. But also I think it is linked to people are not able to manage change, maybe that’s the culture which is too difficult to change, for instance the case of German Example, they were not accepting because it was not exactly the existing system look like. And I have had the discussion with them that you are the first customers I have heard this from, so that’s telling me something, so if I hear it from half a dozen it means there is a trend that if we see the requirements by our specific customers and we didn’t see elsewhere then we look at what are they doing or that requirement is so special and its heart of their business and its secret source, so save the existing systems, don’t change it.

Culture has an impact, working in different parts of the world i.e. Company Culture plus the actual multinational culture. This is one of the challenges when you see big implementation, that you need to implement incrementally e.g. A multinational Company, they build it in one site and go to another site, rather coming up with a worldwide system. i.e. Incremental

Q: What about upgrading and updating the Enterprise System? Based on your experience how often they need to upgrade their system, yearly, monthly, seasonal etc.

R: Very few customers go for yearly upgrade, sometimes every 2,3 years and it varies. From a build perspective, we always try to, the way we do it (We provide set of tools try to figure out about that product) and if customer uses those tools, we guarantee to upgrade, we will provide routines that take them through that upgrades databases. So if we just make it mandatory, we won’t change that certain rules like that i.e. business rules. Occasionally you have to change them but then we have to go and upgrade the scripts and change, but generally we are trying to have this philosophy, if they are using standard tools, it sort of metadata so you can effectively configure that metadata, so that makes it much more easy to upgrade. I think that would be a distinction of something that we are trying to do in IBM with our tools and then encourage our customers to use that standard tools. So you can always programme outside the systems [Maximo], you can also programme in Java etc. sometimes some scripting language, what’s configuration what’s not, but generally we define it using our in-built tools and that’s upgradable. But also our source code is not HIM so the customers can extend with the Java extension for instance. If they do that, then they have to review (you know the must not change our source code), and
customer wouldn’t occasionally know how to do it and if they do it they are on their own really. But the extending source code is more common with pull with some scripting languages, and you can’t guarantee to support that, but you have to advise the customer the best way to do it. So it is better for the customer to stay very close, I mean you see this more of a trend into a earlier life version. But in terms of patches and modifications, software has a certain life, so sometimes customers go out for support if they have very stable environment i.e. it has been working for a long time and customers willing to stay with it. And if they need a patch, it could be a problem, they might be quite happy with the old version of the software. So customer make that decision, if they happy with the old version, they might not come up with modifications for a long time. Most customers, wants to keep it relevantly current. And there is a definite trend in customer feedbacks in the last 3, 4, 5 years to be more incremental, we used to have more big upgrades like technology change, or quite complex upgrades, which end up being very expensive considering implementation, and project management in some cases, so we try to be much more incremental in feeding patches to the enhancement packs on a routine regular basis that customers can take without so much pains in major upgrade cycle. Again if customers configure and extending our system quite a bit and of course it is part of pain, and if you do a lot of your own customer extension and you have more responsibility to take an upgrade. The pattern is, customers wants us to be more incremental and in terms of major upgrade cycle, there is such a lot between customers, but we will try not to have any major products’ updates for couple of years and maybe 3,4 years. An then it becomes a design requirements back into your products, that is what were we looking for at first, and if we do this, it makes the upgrade difficult and the sometimes you don’t do it because it would cause upgrade problem.

Q: for example SAP R/3 has been in the market for quite sometimes and then they changed to a new technology i.e. SAP Hanna

R: yeah and it quite a big lesson for us watching that, you know SAP is a bigger system and it does more things, and generally seems to be very painful to upgrade those systems and we sort of try to learn from that and it makes it easier for us to be flexible.

Q: Can you specify some of the products’ functionalities in terms of embedded roles, or work routines, role definition and their relationship for instance a tab is attached to a role etc.

R: I try not to be, I mean some products are tend to be role focus, for example Software as a service is more tendency to deliver preconfigure roles and you have to
watch that a little bit with an Enterprise System, because when roles become data, and put it in data into the system that customer uses, then maintaining those roles and updating that data which go through different versions, so preconfigure roles have some benefits but they have some downside in terms of maintaining and upgrading your products and often some of those preconfigured roles are not exactly right out of the box anyway.