UNIVERSITY OF TECHNOLOGY SYDNEY

An Interpretive Framework for Complexity in IT Projects

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged.

In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Student:

Gaiyasudeen A. Syed

Date:

DEDICATION

I would like to dedicate this dissertation as a tribute to my father Ansar Basha and my mother Razia Ansar for having encouraged and supported me in my learning and helping me become who I am today.

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ABSTRACT

So learn that you may full and faultless learning gain,
Then in obedience meet to lessons learnt remain.
- Valluvar (Thirukkural 391)

This research was prompted by the continuous failure rate in IT system implementation projects, in one of the largest telecommunication organisations in Australia where the researcher was working as a program manager. There was a consensus among the project management professionals that the human condition experienced by the role of a project manager has severe social implications. This research study is a response to the concern expressed in the project management community that existing project management methodologies are limited by their unduly normative and mechanistic approach.

Research in project management has confirmed that the conventional project definition is not inclusive of the social dimension and attempts to measure the project's success in simplistic terms, using scope, time and cost as parameters. Failing to recognise the inherent complexity (Murray 2000, p. 34) in IT projects is one of the prime reasons why many projects are considered failures. Recent research directions in project management have shown an urgent need to develop theories from project environment to reflect the complexity of projects. (Cicmil & Hodgson 2006; Cicmil et al. 2006; Kwak & Anbari 2009; So'derlund 2004; Williams 1999 ; Winter, Smith, Morris, et al. 2006).

In recent management publications of repute, the application of complexity theory principles has been widely suggested as an effective way to deal with organisational complexities (Sullivan 2011). Complexity theory has also drawn the attention of scholars and practitioners in the project management community. Emerging trends in project management research point to treating projects as complex adaptive systems (Austin et al. 2002; Harkema 2003; Milosevic 1989;

Pundir, Ganapathy & Sambandam 2007; Whitney & Daniels 2013; Whitty & Maylor 2009) learning and temporary organisations (Lundin & Söderholm 1995; Packendorff 1995; Turner & Müller 2003) and organisational techno-social processes (Small & Walker 2012).

A simple inquiry, namely, 'Can complexity theory principles be used to understand the projects better?' led to this research. Based on the literature review two primary research questions were formed:

1. What are the factors believed to cause complexity in IT projects?
2. How does human interaction engender social complexity in IT projects?

Given the explorative nature of this research, a 'constructionist' research paradigm with participant observer mode was adopted (Guba & Lincoln 1994; Strauss & Corbin 1990a; Strauss 1998). For more than two years, detailed data was collected in a large telecommunication organisation. Qualitative data analysis techniques, such as context analysis and grounded theory principles (coding and memo), were applied to narratives and observations collected in a case project.

In order to answer the research question, 'What are the factors believed to be causing complexity in IT projects?' a practitioner's definition of complexity was elicited through extensive interviews in the telecommunication organisation. The complexity factors in the real environment as experienced and perceived by practitioners were listed, analysed and classified. It became evident that the practitioner's view of complexity differs from a mathematical definition of complexity: the practitioner's is born of their experience. The practitioners mentioned such characteristics as 'uncertainty', 'unprecedented', and 'unexpected' to identify a project situation as 'complex'. However, the demarcation between complicated and complex was not distinguishable in practitioners' perception or understanding of complexity.

The classification followed a typology of complexity factors found in the literature review: technological, structural, directional and temporal (Remington & Pollack 2007a).

The research has revealed that environmental, directional, temporal (time) and social complexities are prevalent; they are experienced mostly in comparison to technical and structural complexity and are contrary to the general belief that IT projects are complex due to technological factors.

It was found that complexity originates in three layers: the product, the project (organisational process) and the social. The research participants believed that not all situations in a project manifest complexity, but a few situations exhibit inherent complexity and it is experienced in spurts. As a result of this analysis, a construct called 'tipping point' has been proposed to refer to these atypical project situations in this research. A tipping point is defined as a state where projects experience chaos, conflict, contest and decision-making, and external intervention is required. When I cross-validated this construct with the research participants, they concluded that the number and frequency of tipping points were indicative of the level of complexity the project stakeholders were experiencing.

This research presents the analysis using headings complexity factors, echo of complexity, relationship, action-to-reaction, and emotions. The research has illustrated that, as all types of complexity factors require human interaction, they lead eventually to social complexity.

In order to explore deductively the second research question, 'How does human interaction engender social complexity in IT projects?' a framework using a range of lenses has been applied to a case project. These lenses are Context, Connectedness (Cohesion & Coupling) and Adaptive-Reflexive Response.

Giving preference to transformative teleology, a process perspective has been adopted to analyse the social complexity through the proposed lenses. The lens 'context' explored meaning creation, multi-dimensional interpretations and cognitive schemata at individual and organisational level.

The 'connectedness' lens attempted to demonstrate the influence of private networks beyond formal organisational boundaries and interconnectedness in project decision-making. The 'adaptive response' lens traced the dynamic creation of positions through deliberations in project tipping point situations. The 'reflexive response' lens depicted the time-phased reflexivity in project team members' interactions. The application of these lenses to the case project data attempted to unveil the unfolding complexity; it was concluded that these lenses were suitable for comprehending the underlying social complexity in IT projects.

Recently published literature on application of complexity theory frames to projects, concepts of the complex responsive process of power relating (CRPR) (Cicmil et al. 2009; Cooke-Davies et al. 2007; Stacey & Griffin 2005; Stacey 2000a) and in social theories, symbolic interactionism and organisational sense making (Weick 1995) have provided the necessary theoretical foundation to these lenses. Concepts such as Chaos Theory, Strange Attractors and Complex Adaptive Systems have been mapped in general terms to the project data.

This research has contributed to a body of project management knowledge by introducing 'context', 'connectedness' (Cohesion & Coupling) and 'adaptive-reflexive response' lenses as well as the construct 'tipping point' to comprehend underlying complexity in IT projects.

Further research can be carried out in other industries to confirm the complexity factors arrived at in this research. Agent-based models can be built as competing and cooperating (co-opting) mechanisms for complex scenarios in projects.

Explorative research can be carried out to develop other lenses to capture social complexity in projects. Cross-validating the framework across multiple industries can offset the bias associated with this qualitative research.

The framework is useful for the practitioner to understand project complexity, as the stakeholders do experience it in varying stages of a project. The classification of the complexity factors (static) may help the industry to acknowledge project complexity and create a typology of projects for better treatment through fostering a higher form of collaboration.

This thesis presents the results of an investigation to understand the nature of project complexity factors and how social complexity is generated in IT projects because of human interaction.

Papers Published

1. Syed, G. & Sankaran, S. 2009, 'Investigating an interpretive framework to manage complex information technology projects', *Proceedings of the International Research Network on Organizing by Projects,*, Berlin.

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