Towards a Multi-level Model of Conflict to Sensitise practitioners to the Socio-organisational Complexity of an IT Systems Development Project

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Short running title: Multi-level Conflict Model

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Abstract: Practitioners are typically aware that organisational complexity is important to IT project performance however they are unsure of exactly what it comprises and how they should take it into account in their decision-making. This paper contributes to addressing the 'what' question by taking a multi-level conflict approach to understanding the relationship between individuals, groups and IT project complexity - an area in the literature so far unexplored and thus the basis of this literature survey and theory development. We first assess existing studies of conflict using semantic analysis to identify the basic components of conflict. We consequently examine the relationship between these components. Lastly we formulate a multilevel model of the phenomena to relate conflict to IT Systems Development Project (ISDP) complexity. The resulting model of conflict in ISDPs suggests that conflicts can occur at three different the levels: individual; intra-group; and inter-group. And that the following can be the objects of conflict: tasks, processes, relationships, roles, time, resources, capabilities, values, status, distributive justice, procedural justice. This approach is interesting as the types of characteristics identified by using insights from applied psychology and management are at a granularity that enables practitioners to get a handle on aspects of socio-organisational complexity and thus opens up action research as an approach to studying ISDP complexity.

Keywords: organisational complexity; ISDP performance; conflict; action research

1 INTRODUCTION

Practitioners are typically aware that organisational complexity is important to IT project performance, however, they are unsure of what it comprises and how they should take it into account in their decision-making at a project feasibility stage. Early researchers of project complexity have also recognised that the organisational components of a project are critical to its performance (Baccarini 1996; Williams 2002). Since then the relationship between organisational complexity and project performance was demonstrated, perhaps unsurprisingly, to be more important than that of technical complexity on ISDP (information system development project) performance (Xia and Lee 2004). Increasingly the processes of social interaction, including

the role of communication and power, have become a prominent focus with the recognition that social interaction is an important source of complexity (Cicmil, Williams et al. 2006). More recently Maylor and colleagues (Maylor, Vidgen et al. 2008) studied practitioners' perceptions of complexity and identified stakeholder attributes and inter-stakeholder relationships as important sources of complexity. Despite this the underlying components of socio-organisational complexity, their interactions, and their consequences are not well understood nor do tools exist that are specifically designed to help practitioners identify and manage their risks.

Whilst research in the area of ISDP complexity is sparse, the IS community has studied related issues such as IT project success (Delone and McLean 2003; Petter, DeLone et al. 2008), IT project failure (Sauer 1993; Beynon-Davies 1995; Sauer 1999; Fitzgerald and Russo 2005) and the relationship between IT artefacts and organisations (Kling, Scacchi et al. 1982; Benbya and McKelvey 2006; Orlikowski and Scott 2008). We, however, advocate a different approach to studying organisational complexity. We analyse socio-organisational complexity in terms of interacting project stakeholders and their conflicts. Conflict is relatively well studied phenomena outside of IS (Wall and Callister 1995; De Dreu and Weingart 2003; Korsgaard, Soyoung Jeong et al. 2008) and conflicts are increasingly becoming the object of study within the IS discipline (Robey and Farrow 1982; Robey, Farrow et al. 1989; Robey, Smith et al. 1993; Barki and Hartwick 1994; Miranda and Bostrom 1994; Kumar 1996; Symon, Long et al. 1996; Ahn and Skudlark 1997; Barki and Hartwick 2001; Chiasson and Dexter 2001; Sawyer 2001; Eschenfelder 2003; Cohen, Birkin et al. 2004; Paul, Samarah et al. 2005; Wong 2005; Leidner and Kayworth 2006; Sherif, Zmud et al. 2006; Currie and Guah 2007; Kankanhalli, Tan et al. 2007; Lira, Ripoll et al. 2008; Campbell, Fletcher et al. 2009). We regard conflict as particularly worthy of study as quantitatively and qualitatively there are indications that it accounts for a significant proportion of variance in ISDP performance (Robey, Smith et al. 1993; Barki and Hartwick 2001; Sawyer 2001; Cohen, Birkin et al. 2004; Wong 2005; Moeller and Zhang 2008).

From a conflict perspective, an ISDP comprises a set activities that require stakeholder cooperation and support, and thus conflict resolution, for its overall success – sharing similarities with the Triangle of Dependencies Model (Sauer 1993). Using this approach, organisational complexity can be expressed in terms of a network of stakeholder interactions required to bring a project deliverable into existence. A project that

exhibits a high degree of socio-organisational complexity will have a large potential for conflict and a low potential for resolution of conflicts. Conversely, a project that exhibits a low degree of socio-organisational complexity will have a low potential for conflict and a high potential for resolution.

This paper's key contribution is to provide a model of the components of socio-organisational complexity and their implications for ISD projects at a granularity sufficient to inform practice and thus enable action research / design science (Baskerville and Wood-Harper 1996; Baskerville and Myers 2004; March and Storey 2008). We reviewed over 170 IT, Management and Applied Psychology articles from over the past 20 years and found 71 articles that treated conflict as the object of study. Of the IS related literature, we noted that 8 of 14 articles randomly chosen for Semantic Analysis did not explicitly define conflict despite having the term in its title. Adopting the premise that better theories of conflict will result in a better understanding of kinds of entities that cause ISD project complexity, we propose a multi-level model of conflict that explains what factors influence stakeholders to cooperate or conflict and thus identify a range of factors that contribute to socio-organisational complexity.

Our multi-level model of conflict both resembles and is different from earlier models. Like earlier models it conceptualises conflict as a result of interaction between several antecedents. It also adopts a neutral stance to conflict as in certain situations it can improve work and in other situations not (Jehn 1995; Jehn 1997; De Dreu and Weingart 2003; Jehn and Bendersky 2003; De Dreu 2006). Unlike earlier models identified in the IT literature it explicitly adopts a multi-level approach explicitly acknowledging that different social forces apply in individual vs. intra-group vs. inter-group situations. Considering the relatively fragmented prior research with respect to conflict in the IT literature, the contribution of our model will expose practitioners and academics to the multi-level nature of conflict and its implications for organisational complexity.

We begin our theory-building effort by defining the phenomena of study and using semantic analysis to identify the basic components of conflict. We then identify the conditions that affect a conflict's potential for resolution. Subsequently we identify the kinds of thing that are objects of conflict and how different levels of conflict influence conflict behaviour.

This paper is structured such that Section 2 (Background) introduces the reader to information system development project (ISDP) complexity and frames the problem area within relevant streams of related work from Complex Adaptive Systems, Soft Systems Thinking, Social Informatics and IS success/failure studies as well as pointing out the general deficiencies of these existing studies. Section 3 defines the phenomena of the study that we call conflict. Section 4 presents our theory building efforts and ties together insights from IS with

Management and Applied Psychology. Section 5 presents a discussion of our findings and its implications for our current understanding of organisational complexity in academia and in industry. Section 6 concludes and presents opportunities for future work.

2 BACKGROUND

Project complexity can be considered across many dimensions. According to Baccarini (Baccarini 1996) project complexity comprises the differentiation and interdependency of interrelated parts. These parts can be differentiated along various dimensions however it has become convention to divide the parts in terms of 'organisational' and 'technological' (Baccarini 1996; Williams 2002; Maylor 2003; Xia and Lee 2005) although this distinction has been extensively critiqued (Orlikowski and Scott 2008). More recently, processes of social interaction, including the role of communication and power, have become a prominent focus with the recognition that social interaction is an important source of complexity (Cicmil, Williams et al. 2006). In line with Cicmil (Cicmil, Williams et al. 2006) and Orlikowski (Orlikowski and Scott 2008), Maylor and colleagues (Maylor, Vidgen et al. 2008) decompose project complexity into five dimensions avoiding the flawed organisational-technological distinction: *Mission*, in which objectives, scale, uncertainty and constraints are considered; *Organisation*, in which time, space, geography, project/organisation fit and organisational change are recognised; *Delivery*, in which project processes such as administration, decision-making, change management and project management methodology are taken in account along with human, technological and financial resources; *Stakeholders*, in which time stakeholder identification, support, relationship basis, experience, power, interdependencies, socio-political factors and importance are taken into account; *Team*, in which project staff, project manager and group attributes are taken into account.

For the purposes of providing a general overview of ISDP complexity the following two sets of dimensions are found to be useful: structural vs. dynamic; product vs. project (Williams 2002). Structural complexity refers to the difficulty in comprehending the behaviour of a system due to the interdependencies and heterogeneity of its constituent parts. Interdependencies, in this context, may be categorised as of three types: pooled, in which each part gives a discrete contribution to the system independent of the other parts; sequential where changing a

single part results in a linear chain of knock-on effects; reciprocal, where changing a single part *p* triggers a cycle of knock-on effects including additional knock-effects to part *p*. In contrast to structural complexity, dynamic complexity refers to the difficulty in comprehending the behaviour of a system due to the changes in its constituent parts, or changes to their relationships, over time. Product complexity refers to the difficulty in comprehending and engineering the project deliverable due to its number of parts, the heterogeneity of the parts and the nature of their interdependencies. Whilst in contrast to product complexity, project complexity refers to the difficulty in comprehending and engineering the project deliverable within socio-material constraints that represent the project and its environment e.g. time, space, geography, project processes, financial resources, technological resources, human resources, stakeholder relationships and attributes (Maylor, Vidgen et al. 2008). These two distinctions thus divide ISDP complexity into four interrelated parts: Structural Product Complexity (SProd); Structural Project Complexity (SProj); Dynamic Product Complexity (DProd); Dynamic Project Complexity (DProj).

This paper expands upon our understanding of SProj complexity by considering complexity that emerges from group processes (interactions between people and groups of people) in relation to ISDPs. Previous considerations of ISDP complexity have not placed much attention on the social psychology (interplay between individuals and groups) of stakeholders and their influence on ISDP complexity. Our current knowledge of ISDP stakeholders is: i) project stakeholders hold differing views, assumptions and interests; ii) these views, assumptions and interests are mutually constituted by an organisation's socio-political environment e.g. assemblages of power, status, norms, values and material artefacts brought into existence via group processes (Kling, Scacchi et al. 1982; Bloomfield and Coombs 1992; Checkland and Holwell 1997; Orlikowski 2000; Stamper, Liu et al. 2000; Lamb and Kling 2003; Orlikowski and Scott 2008). As a consequence practitioners may perceive the following consequences if group processes are not appropriately managed: i) insufficient top-down or end-user support due to disagreement over issues such as what the problem is, how it should be addressed, and what a successful outcome would be; ii) project managers have limited control over project resources perhaps due to lack of trust or insufficient support from top-management; iii) insufficient project staffing, or inappropriate skill proficiency due to ambiguity surrounding the project's personnel requirements or lack of stakeholder support resulting in resources being deployed to other projects. The overall consequent is that the project underperforms and delivers a system that is perceived by stakeholders to be inadequate or poorly performing.

The complexity, or complicatedness, of information systems development projects (ISDP) has been studied for a number years from a number of disciplinary perspectives. Broadly speaking there are three streams of complementary work: those interested in categorizing and understanding the relative impact different sources of complexity contribute to project performance; those interested in understanding the complexity surrounding a project's hard metrics (e.g. budget and schedule); those interested in understanding the complexity of the interrelationship between people and the technological artefacts (project deliverable).

2.1 ISDP Complexity and Project Performance

Xia and Lee (Xia and Lee 2004) performed a regression study of the relationship between ISDP complexity and ISDP performance.Their study of 547 projects in North America and Canada demonstrated that structural organisational ccomplexity appears to influence project performance far more than any other kind of complexity. This study can be understood to indicate that whilst industrial practitioners have the tools and know-how to cope with technical complexity, this is not the case for structural organisational complexity. In this particular study structural organisational complexity was operationalised in a survey as top-down support, user support, suitable staffing resources and lack of control of project resources.

2.2 ISDP Complexity and hard-metrics

The complexity of delivering projects that meet budget, schedule, and scope requirements (hard-metrics) has been studied for a number of years using System Dynamics (Rodrigues and Williams 1997; Eden, Williams et al. 2000). Projects exhibit a complicated feedback behaviour termed the rework cycle (Rodrigues and Williams 1997). This dynamic results in counter intuitive performance for example: i) that as a project falls behind schedule an attempt to accelerate the project, by deploying more man-power, can result in poorer productivity than if no acceleration attempt was made (Brooks 1995; Howick and Eden 2001); ii) if a change to a work-package is made, the resultant time and cost is far greater than intuitively estimated. Modification results in cascades of changes requiring far more time to implement than originally expected (Williams, Eden et al. 1995).

2.3 ISDP Complexity and the interrelationships between people, groups and technology

The complexity of the interrelationship between people and the project deliverable (technological artefact) has been studied using many different theoretical approaches. Three of the most prominent approaches relevant to information systems engineering are: Complex Adaptive Systems; Soft Systems Thinking; and Social Informatics.

The complex adaptive systems (CAS) stream views people and technology as a system of mutually adapting elements that exhibit emergent behaviour akin to any other complex system in the natural world. The CAS metaphor is used to explain the interrelationship between people and technology in terms of seven features of CAS: adaptive tension; causal intricacy; positive feedback; requisite complexity; change rate; modular design; coordination rhythms (Jacucci, Hanseth et al. 2006). The metaphor has been used towards explaining information systems development in terms of a co-evolutionary adaptation between the information system design and stakeholders' continually evolving requirements (Benbya and McKelvey 2006).

The metaphor has also been used to describe the dynamics of technology enabled organisational change in terms of an adaptive tension between an organisations need to exploit its existing IT resources vs. its need to find and explore opportunities to exploit newer potentially higher yielding IT resources (Chae and Lanzara 2006). It is argued that IT enabled change is subject to self-destructive dynamics as support tends to become fragmented between those wanting to focus purely on exploiting the existing system, those wanting evolutionary change and those wanting revolutionary change resulting in a total collapse of support for the project. It has also been used to describe other situations such as IT alignment at a strategic, operational and individual level (Benbya and McKelvey 2006).

The Soft Systems (SS) stream views people and technology as mutually interdependent and comprising elements that exist in a broader organisational environment comprising social and political forces which in turn are shaped by the goings on in society e.g. social issues, politics and economics. SS uses the notion of purposeful systems to identify commonalities and inconsistencies between different stakeholder perspectives in order to help structure and make-sense of complicated situations. In SS, the social is non-prescriptively analysed in terms of the interrelationships between: roles, norms and values (Checkland and Poulter 2006). In SS, politics is non-prescriptively analyzed in terms of commodities of power (Checkland and Poulter 2006). The SS approach has been used to successfully analyse information system requirements in messy situations for example the design of a Wind Tunnel information system for a large aerospace company and the design of a research support

information system (Vidgen 1997; Checkland and Poulter 2006). It has also been used in IT related areas such as creating information technology strategies, and evaluating information systems and broader initiatives in complex public sector settings (Checkland and Holwell 1997)

The Social Informatics (SI) stream views people and technology as mutually interdependent and linked via networks (or webs) of relations (Kling, Scacchi et al. 1982; Lamb, Sawyer et al. 2000; Horton, Davenport et al. 2005). Unlike SS, it places a greater emphasis on the influence of institutional properties through the concept of organisational history shaping trajectories of choice; secondly it places a greater emphasis on the social via influence & status; and thirdly the political via its treatment of power and group decision-making. Whilst SS acknowledges that choices are not made in a socio-political vacuum, SI actively probes the forces that influence these choices. Whilst SS acknowledges that information systems are a product of complex interests and technical constraints, SI actively probes the structures (Production Lattice) by which engineers use power to marginalise certain interests via appeals to technical authority. The SI approach has successfully been used as a framework to inform the development of software engineering methodologies, particularly Multiview, by offering alternatives to functionalist perspectives which most mainstream methodologies are constrained by (Wood-Harper and Wood 2005). However we contend that approaches from SI, like approaches from CAS and SS, do not take into account the social psychology (interplay between individuals and groups) at a fine enough granularity to inform practitioner decision-making at the feasibility stage of an information systems development project.

2.4 Other studies that inform ISDP complexity research

There is no single body of research that attempts to address the research problem however there are many streams of research that inform our understanding of the ISDP complexity. IT success and failure studies also offer insights into the challenges organisational complexity.

2.4.1 IT Failure studies

ISD (Information System Development) failure is an ongoing theme in the study of Large Scale Complex IT Systems and is especially well researched in the Information Systems (IS) literature. Failure is, by nature, not a

well-defined concept as it is a stakeholder's subjective judgement of a system, or project, at a particular time with respect to their expectations (Sauer 1999). It has been demonstrated that over-time a stakeholder's perception of an ISD project changes and is dependent upon their perspective and the legitimacy of other voices (Wilson and Howcroft 2002). In consequence, the literature identifies several broad types of failure: Correspondence failure; Process failure; and Interaction failure (Lyytinen and Hirschheim 1987; Fitzgerald and Russo 2005). Correspondence failure is where the project fails to meet its business case e.g. productivity goals or job cuts. Process failure refers to outcomes where the development process is perceived as the source of failure e.g. over-budget, over-time, or abandoned. Interaction failure comprises poor system usage despite the system meeting its specification e.g. a technological success yet an organisational failure. An alternative conception of IT failure, offered by (Sauer 1993), is the withdrawal of stakeholder support that occurs when a project is no longer perceived by stakeholders to be serving their interests.

ISD failure is studied using two dominant approaches: identifying failure factors and identifying failure processes/dynamics (Sauer 1999). Both approaches are predicated on the hypothesis that if the causes of failure can be identified, we can monitor and control those risks. Early studies focused on simple causes and often identified the cause as the shortcomings of individual IT practitioners or IT managers. However (Colton 1972) identified that most of the difficulties were social and behavioural rather than technical. This result was confirmed and generalised by (Lucas 1975) and later by (Boland and Hirschheim 1987). The bulk of the research has therefore identified social and behaviour factors *associated* with failure and these factors have typically been treated as *causes* of failure despite the fact that there exist few large-scale statistical studies to illustrate the extent risk factors correlate with ISD project performance[1]. An alternative stream of research to factor studies, the process/dynamics of failure approach, appeared in the 1980s with the study of resistance to ISD. These studies identified shop-floor politics, executive resistance, IS professionals resistance and organisational culture as processes that cause resistance (Markus 1983; Sauer 1993; Lapointe and Rivard 2005).

2.4.2 IT Success Studies

Studies of information systems success comprise two broadly linked streams of research. Those interested in the qualities of successful IT systems and those interested in successful organisational outcomes. Those that define

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[1] Wallace, L., M. Keil, et al. (2004). "Understanding software project risk: a cluster analysis." Information & Management(42): 115-125, Han, W.-M. and S.-J. Huang (2007). "An empirical analysis of risk components and performance on software projects." Journal of Systems and Software **80**(1): 42-50. are notable examples of these few studies.

success in terms of qualities of system output are interested in system quality, user acceptance, use, changes in attitudes/behaviour (Delone and McLean 2003; Petter, DeLone et al. 2008). Those that define success in terms of outcome tend to be interested in profit, decision quality and user satisfaction; they perceive system quality and acceptance as possible antecedent of success (Ein-Dor and Segev 1978; Gable, Sedera et al. 2008).

The debate in success studies falls into three types of discussion of which all three share the thesis that risks are inhibitors of success: broader causes of risk factors; risk factors; and practice to address risk factors. The broader causes of risk factors are discussed in terms of organisational, social and political aspects of the ISD projects (Keen 1981; Markus 1983; Sauer 1993). The risk factors discussion identifies the following (and others) as inhibitors of success: non-existing/non-willing users; multiple users; personnel turn-over; lack of purpose; scope-creep; planning and control; technical complexity; size; volatility; functional fit; overcoming organisational inertia (Jiang, Klein et al. 2001; Schmidt, Lyytinen et al. 2001; Wallace, Keil et al. 2004; Sauer, Gemino et al. 2007; Seddon, Calvery et al. 2010). Practice to address risk factors is, on the whole, rather vague and includes checklists, frameworks and processes to align IT with business; encourage top management support; address change issues; rationalise business processes; emphasise the importance of intangibles; focus on metrics (Sarkis and Sundarraj 2003; Bannerman 2008). It is recognised however, that despite there being a need and a potential for risk management approaches to contribute to project outcomes, there is a gap between the reality of practice and existing approaches that needs to be addressed for project outcome to be improved (Bannerman 2008).

3   DEFINING CONFLICT

The first step of our theory building was to define the phenomenon of study and then underlying constructs. In line with previous exploratory studies, we used semantic analysis to get a greater understanding of the phenomena of study through decomposition (Lapointe and Rivard 2005). Firstly, we identified syntactically unstructured expressions referring to the phenomena. The primary source was a set of 17 definitions identified from the IT and management literature. Secondly, we identified commonalities among the proposed definitions. Thirdly we identified correspondence among the semantic primitives identified in each definition. Whilst not all

definitions contained all the concepts the following common basic primitives were identified: initial conditions; subject of conflict; object of conflict; conflict behaviour.

Initial conditions: There is a broad a consensus that the subjects of conflict must share an interdependency for a conflict to occur. This interdependency normally arises due to a need or commitment to achieve a particular outcome (Locke, Smith et al. 1994; Priem, Harrison et al. 1995; Jehn 1997; Hayward and Boeker 1998; Janssen, Van De Vliert et al. 1999; Barki and Hartwick 2001; Eschenfelder 2003; Leidner and Kayworth 2006; Korsgaard, Soyoung Jeong et al. 2008). However it can also be in the form of social relations and even via an intermediary such as an information system (Campbell, Fletcher et al. 2009).

Subjects of conflict: The subjects of conflict are the stakeholders that perceive an object of conflict. The stakeholders can be <u>individuals</u> (Rizzo, House et al. 1970; Netemeyer, Johnston et al. 1990; Tubre and Collins 2000), <u>team/group members</u> (Locke, Smith et al. 1994; Priem, Harrison et al. 1995; Amason and Sapienza 1997; Janssen, Van De Vliert et al. 1999; Jehn, Northcraft et al. 1999; Pelled, Eisenhardt et al. 1999; Barki and Hartwick 2001; Jehn and Mannix 2001; Sawyer 2001; Paul, Samarah et al. 2005; Kankanhalli, Tan et al. 2007; Korsgaard, Soyoung Jeong et al. 2008; Lira, Ripoll et al. 2008; Campbell, Fletcher et al. 2009; Jehn, Rispens et al. 2010) or <u>groups</u> (Hayward and Boeker 1998; Leidner and Kayworth 2006).

Object of conflict: The object of conflict is another subject's demands or behaviour that is perceived to interfere, or be incompatible, with the subject's interests[2] (Locke, Smith et al. 1994; Janssen, Van De Vliert et al. 1999; Barki and Hartwick 2001; Jehn and Mannix 2001; Eschenfelder 2003; Kankanhalli, Tan et al. 2007; Korsgaard, Soyoung Jeong et al. 2008; Lira, Ripoll et al. 2008). The behaviour or demands can be contradictory social roles (Campbell, Fletcher et al. 2009), the meaning of information (Jehn 1995; Priem, Harrison et al. 1995; Amason and Sapienza 1997; Sawyer 2001), values (Leidner and Kayworth 2006), people's normal attempts to cooperate and coordinate (Jehn 1997; Paul, Samarah et al. 2005), how-to perform a task (Priem, Harrison et al. 1995; Jehn 1997; Jehn, Northcraft et al. 1999; Kankanhalli, Tan et al. 2007), and how to delegate resources (Jehn 1997; Jehn, Northcraft et al. 1999; Kankanhalli, Tan et al. 2007)

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[2] Note the careful use of the term *perceived* and the phrase *interfere/incompatible with interests*. A perceived inconsistency between the behaviours of subjects is not sufficient to trigger a conflict. Nor is behaviour that interferes with a subject's interests but is not perceived to be by the subject. The behaviour must be perceived as interfering with the subject's interests.

Conflict behaviour: Conflict behaviour describes the manner in which the subjects respond to perceiving an object of conflict. These can comprise defining and maintaining social roles (Campbell, Fletcher et al. 2009), negative emotional reactions (Pelled, Eisenhardt et al. 1999; Tubre and Collins 2000; Barki and Hartwick 2001; Jehn and Mannix 2001; Eschenfelder 2003; Kankanhalli, Tan et al. 2007; Korsgaard, Soyoung Jeong et al. 2008; Lira, Ripoll et al. 2008), avoidance, accommodation, competition, collaboration, reduced commitment and compromise to resolve the conflict (Locke, Smith et al. 1994; Barki and Hartwick 2001; Paul, Samarah et al. 2005; Leidner and Kayworth 2006).

4 TOWARDS A MULTI-LEVEL CONFLICT ORIENTED FRAMEWORK FOR UNDERSTANDING SOCIO-ORGANISATIONAL COMPLEXITY

In light of the set of primitives identified in the previous section, we further examined conflict's initial conditions, subjects of conflict, objects of conflict and conflict behaviours. A systematic literature survey was performed comprising a search for all articles including the term "conflict" in their title between January 1990 to July 2010. The following journals were included in the search, the Senior Scholars' Basket of IS Journals (EJIS, ISJ, ISR, JAIS, JMIS, MISQ) as well as JIT, IT&P, JCSCW, CACM and BIT. A similar search was additionally performed in the following upper-tier journals from Management and Applied Psychology: JAP; JP&SP; ASQ; JOM; MS; AMJ. These articles were supplemented using ad-hoc searches and searching through references in-line with recommendations from (Webster and Watson 2002).

The initial literature search identified 171 articles. After examining the abstract of each article a final 71 articles were found to be of relevance to this study.

The literature survey identified: i) the important types of initial conditions for a conflict; ii) the dimensions of an interaction that affect conflict behaviour; iii) two broad kinds of objects of conflict and three levels that influence the subject of conflict. Figure 1 shows an overview of the structure of Section 4.

Insert Figure 1 here

4.1 Initial Conditions

One way of understanding the initial conditions of a conflict is to use Deutsch's (Deutsch 1949; Deutsch 1973) theory of conflict. Deutsch (Deutsch 1949) theorised and then later demonstrated that the extent to which subjects perceive their goals/interests as interdependent is a good predictor of the consequences of interaction. Hundreds of studies have demonstrated that in cooperative situations people perceive that their goals/interests are linked so that one person's goal/interest attainment makes the other's goals/interests closer. In competitive situations, the opposite is true; people perceive their goals to be negatively dependent.

In light of goal/interest dependency, conflict emerges from the class of situations where people perceive their goals/interests as positively interdependent but their actions interfere with another's actions thus interfering with the other's interests. This class of situation is described as cooperative conflict (see Table 1) and is typical of the stakeholder interactions found in ISD projects e.g. stakeholders negotiate and coordinate behaviour so as to align actions with each other's interests to broker a successful project.

Insert Table 1 here

The implication for ISDP organisational complexity is that the higher the extent that project stakeholders perceive a positive interdependence amongst themselves, the lower the organisational complexity as positive interdependence improves the likelihood of a cooperative resolution.

4.2 Determinants of conflict behaviour

As stated previously, the extent to which a project will exhibit organisational complexity is dependent on the nature of the network of stakeholder interactions required to bring the project deliverable into existence. A project that exhibits a high degree of complexity will consist of a network of stakeholders with a large potential for conflict and a low potential for cooperative resolution. Whilst the previous subsection identified the basic initial conditions that produce a potential for conflict, this subsection provides a more granular account identifying the factors that determine the likelihood of the subjects behaving in a manner that facilitates a conflict resolution. Readers interested in more general conflict behaviours such as power plays, passive-aggressiveness can refer to (Wall and Callister 1995; Barki and Hartwick 2001; Jehn and Bendersky 2003). The literature review identified the following factors as determinants of the potential for resolution: situational

factors such as the interdependence of actors' outcomes; the importance of actors' outcomes; the acceptability of conflict; temporality of conflict within a project; quality of communication; subject characteristics, power; trust; culture; group homogeneity.

4.2.1 Situational Factors

A cooperative resolution is dependent upon positive outcome interdependence between stakeholders. Task interdependence is a well documented mediator of conflict. In general, having positive interdependence between conflicting parties increases decision quality and affective acceptance of outcome especially in situations with high personal conflict (Janssen, Vliert et al. 1999). In situations with high task conflict and low personal conflict, high interdependence has been measured to mildly decrease decision quality and affective acceptance[3]. Positive interdependence promotes integrative behaviour in situations with low task conflict (or high task conflict & personal conflict). This means positive interdependence promotes behaviour that maximises total outcome for parties involved. Positive interdependence promotes reductions in distributive behaviour in situations with low personal conflict (or high task & personal conflict). This means positive interdependence discourages behaviour that maximises unequal outcome for the respective parties. The implication for ISDP organisational complexity is that positively dependent stakeholders are more likely to reach an acceptable resolution than those either negatively dependent or independent and therefore exhibit less organisational complexity.

The speed of a cooperative resolution is affected by the importance of interests affected by the conflict. The importance amplifies the positive and negative effects of a conflict and may speed up resolution (Jehn 1997). If an organisation's norms accept conflict then this also typically amplifies both the positive and negative impacts of conflict (Jehn 1995; Jehn 1997). The implication for ISDP organisational complexity is that projects that deal with important interests are volatile and therefore exhibit greater organisational complexity since interest importance amplifies the negative effects of conflict that could derail a project.

A history of previous interactions sets a precedent for future interactions (Callister and Wall 2001). The implication for ISDP organisational complexity is that projects that deal with stakeholders that have a history of conflict will exhibit greater organisational complexity.

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[3] We hypothesise that this decrease is explainable by group dynamics. Since the conflicts are not attributable to personal issues, parties may invoke group identities resulting in bias mildly decreasing decision quality and affective acceptance.

The perceived ownership of ideas, or positions, reduces the likelihood of a cooperative resolution making it more likely to escalate (De Dreu and van Knippenberg 2005). These effects are weaker when epistemic needs were raised through process accountability or when individuals were able to differentiate themselves from their ideas. The implication for ISDP organisational complexity is that projects that deal with multiple stakeholders that hold ownership of conflicting ideas (objects of conflict) will exhibit greater organisational complexity.

4.2.2 Temporal Factors

A cooperative resolution is influenced by the time period within a project that the stakeholder interaction appears. Higher group performance is associated with a specific pattern of conflict (Jehn and Mannix 2001). A high performing group at the beginning of a project will have low but increasing levels of task conflict, a low level of relationship conflict and a low level of process conflict. At the midpoint of the interaction there will be moderate levels of task conflict and this will subside towards the end of the project. It is suggested that these teams had established value systems, high levels of trust and respect and open discussion norms around conflict during the beginning of the project to enable cooperative conflict at the middle stages of their interactions. This is supported by the work of (Tjosvold, Poon et al. 2005) who identified that prior cooperative conflict (consensus based conflict resolution) promotes confidence in team relationships (as perceived by team members) and promote team effectiveness (as perceived by team's manager). Equally (Amason and Sapienza 1997) found that teams with a greater openness have less relational conflict. Conversely low group performance is associated with a particular pattern of conflict. It begins with low task, relationship, and process conflict until the end where conflict peaks (Jehn and Mannix 2001). The implication for ISDP organisational complexity is that projects that expect stakeholder conflict either at the start or at the end of a project exhibit greater organisational complexity, since it disrupts the pattern found in successful high performing teams.

4.2.3 Communicative Factors

A cooperative resolution is dependent upon good quality communication as poor quality communication can be perceived as political manoeuvring (Zhang, Dhaliwal et al. 2008). Intra-group communication promotes cooperation in social dilemmas (Kerr and Kaufman-Gilliland 1994). Experimental results support that communication is believed to increase cooperation via individuals making commitments and building trust not by the development of group identity (Kerr and Kaufman-Gilliland 1994). When actors are left out of the loop, or receive last minute communication, or delayed communications this can be perceived as a provocation.

Common examples of this include delays communicating changes to requirements, developers changing code without notifying testers, testers failing to provide feedback to developers, developers failing to communication with users (Zhang, Dhaliwal et al. 2008).

Conflict can also occur because of theme incompatibilities, language differences, incomplete or specialised knowledge (Sonnenwald 1995). Theme incompatibility occurs when one party is unable to answer questions in another's terms. For example a user asks how much a particular feature will cost and the developer responds by explaining the standard pricing model of function points rather than the price in terms of cash. Language differences can cause parties to believe commitments or assurances have been made when they haven't, resulting in conflict. Incomplete or specialised knowledge can be perceived as obfuscation when in fact a certain variable in unknown or uncertain/vague in nature. Conflicts can also occur because of blunt communication that is perceived as an attack upon an individual or group's status/reputation (Kock and McQueen 1998). It has been noted that top performing teams, in contrast to low performing teams, focus on content of communication rather than delivery style and explicitly discuss reasons behind decisions (Behfar, Peterson et al. 2008). It has also been noted that a problem solving communicative approach enhances the effectiveness of conflict resolution (van de Vliert, Euwema et al. 1995). The implication for ISDP organisational complexity is that projects with stakeholders that exhibit low quality communication skills will exhibit greater organisational complexity.

4.2.4 Subject Characteristics

Cooperative resolution is also affected by a subject's agreeableness and their perceptual frame type. Subjects that are perceived to be agreeable adopt problem solving and accommodating behaviours; those that are perceived to be disagreeable pursue outcome fighting and passive resistance/concealment. Subjects that are perceived to be neither agreeable or disagreeable adopt avoiding, compromising, process controlling and issue fighting behaviours (van de Vliert and Euwema 1994). Subjects that are perceived as highly agreeable perceive less conflict in their interactions and rate them more positively than low-agreeable perceivers (Graziano, Jensen-Campbell et al. 1996). The implication for ISDP organisational complexity is that projects with potentially conflicting stakeholders that exhibit a low agreeableness will exhibit greater organisational complexity.

During a conflict resolution the perceptual frames of the subjects influence each other and converge (Pinkley and Northcraft 1994). Resolution pay-offs are largest when subject's adopt a pro-social rather than a win-frame view of conflict (Pinkley and Northcraft 1994). It has been noted that groups with pro-self perceptual frames show greater dedication and function more effectively than pro-social groups on creativity tasks, whereas pro-social groups show greater dedication and function more effectively on planning tasks where greater coordination and cooperation is required (Carnevale and Probst 1998; Beersma and De Dreu 2005). In gain and loss situations, (De Dreu and McCusker 1997) demonstrated that humans exhibit three kinds of behavioural strategy labelled: pro-social; individualist; competitive. Pro-socials in a gain frame are likely to share loss evenly but not gains. In a loss frame pro-socials tend to cooperate more. Individualists in a gain frame are more likely to share gains evenly but are less likely to share losses. In a loss frame they cooperate less. Actors of a competitive nature cooperate as little in a loss frame as a gain frame. The implication for ISDP organisational complexity is that projects with potentially conflicting stakeholders that exhibit pro-social tendencies have a lower organisational complexity as the likelihood of a resolution being acceptable increases.

4.2.5 Power

The likelihood of a cooperative resolution is affected by stakeholders' relative power. Stakeholders in equal positions of power are more likely to be exploitative than those in power asymmetries (Solomon 1960). Under conditions of equal power an actor is likely to be exploitative if the other party unconditionally cooperates, whilst cooperative if other party cooperates on condition. In unequal power conditions the opposite is true. If the other party cooperates unconditionally then so will the actor. The implication for organisational complexity is that stakeholders in equal positions of power are more likely to be exploitive and thus increase the likelihood that conflicts will remain unresolved.

In inter-organisational settings, the opposite has been observed, people representing organisations with power are less compromising and less collaborative than those with equal power (Callister and Wall 2001). At the intra-organisational level, it has been observed that judgements are influenced by the interests of powerful groups within an organisation. The influence of these power groups is impeded by the relative power (and thus reputation) of the judger (Hayward and Boeker 1998).

These effects have been observed and studied in the field of Computer Science and Information Systems. Studies of the type of user participation within the development process support claim that situational factors

mediate conflict and hence cooperative stakeholder behaviour in organisational settings (Robey, Farrow et al. 1989). (Robey, Welke et al. 2001) argue that the traditional life cycle, iterative incremental and component based development all have qualitatively different approaches to user participation/communication and therefore the manner in which conflict emerges is different. The traditional life cycle paradigm uses a carefully designed social process that relies on a linear process that suppresses conflict by creating a power-relationship between the developer and user. The developer controls the sequential interaction with users thereby suppressing 'off-topic' issues that become rarely addressed. The iterative incremental paradigm uses a structured process to bring together the developer and user. However, the interactions are less structured thereby giving the user more power to direct attention to conflict issues than in traditional development. It is also argued that users and developers are more interdependent on each other as users assist in designing and therefore this provides shared goals for cooperative behaviour. The component based development paradigm uses a structured process to bring together the developer and the user but gives the user the power to build complete systems from components thereby removing dependence on in-house staff (Robey, Welke et al. 2001), although research by (Garlan, Allen et al. 2009) disputes this claim. In this paradigm, conflicts are addressed through buyer-seller negotiation, however end-users' lack of formal training to deal with companies can result in them using intermediaries and also becoming dependent on suppliers or component brokers, thus attenuating the desired benefits.

The implications for ISDP organisational complexity are that projects with potentially conflicting stakeholders that are of equal power will exhibit more organisational complexity than those with unequal power. In an inter-organisational setting, the opposite is true, stakeholders from organisations with equal power will be more cooperative and thus organisational complexity will be lower than in unequal power situations.

4.2.6 Trust

Trust is an important determinant of conflict behaviour and cooperative resolutions. Specifically trust is necessary to gaining benefits of task conflicts without suffering the cost of relationship conflict (Simons and Peterson 2000). Trust is associated with open communication and showing concern for employees (Korsgaard, Brodt et al. 2002). Subjects that are high in trust concede more to a disappointed counterpart than with low trust situations which may improve the relationship between subjects (Van Kleef, De Dreu et al. 2006). Competence

based trust is known to strengthen the relationship between task conflict and decision quality (Olson, Parayitam et al. 2007). The implications for ISDP organisational complexity are that projects with trusting stakeholders will exhibit a lower complexity as trust facilitates resolutions that improve decision quality and relationships.

4.2.7 Culture

Culture influences conflict behaviour by way of shaping a person's perceptual frame and moral judgements. Research by (Tinsley 1998) demonstrates that a subject's preference for style of conflict behaviour can be reliably predicted by understanding a subject's group's attitudes toward hierarchical differentiation, explicit contracting and polychronicity. American subjects were more likely to adopt an interest based view towards resolving a conflict, German subjects were more likely to adopt a rules and regulations approach and the Japanese subjects refer the situation to high status/power subjects. Culture influences the morality used in determining a conflict behaviour and outcome. Some cultures, like Indian culture, determine conflict outcome in terms of interpersonal expectations whilst some culture, like US culture, determine conflict outcome in terms of justice expectations (Miller and Bersoff 1992).

The implications for ISDP organisational complexity are that projects that involve subjects from different cultures exhibit a greater complexity since the resolution mechanisms used by the subjects are likely be inconsistent resulting in an increased difficulty in arriving at cooperative resolution.

Culture has also been linked to the self-serving biases judgement biases of fairness. It was found that more individualistic cultures, such as the USA, are more likely to exhibit such biases in comparison to collectivistic culture, such as Japan (Gelfand, Higgins et al. 2002). In two other studies, American subjects were noted to be far more likely to adopt a competitive (win) frame whilst Japanese subjects are more likely to adopt a compromise frame (Tinsley 1998; Gelfand, Nishii et al. 2001; Tinsley 2001). The implications for ISDP organisational complexity are that projects that involve stakeholders from individualistic cultures exhibit a greater organisational complexity since perceptions of potential resolutions are more likely to be viewed as biased by individualistic parties or reasonable resolutions may be rejected.

4.2.8 Group Homogeneity

Group diversity influences conflict behaviour in numerous ways. Task conflict can be triggered by a dissimilarity of functional background. Relational conflict can be triggered by dissimilarity of race or class

(Pelled, Eisenhardt et al. 1999). In team settings, informational diversity improves team performance (Jehn, Northcraft et al. 1999). In team settings, cognitive diversity improves decision outcomes (Olson, Parayitam et al. 2007). In work group conflict, asymmetric conflict perceptions decrease performance and creativity in groups (Jehn, Rispens et al. 2010). This affect is mediated by positive group atmosphere and social processes such as communication and cooperation (Jehn, Rispens et al. 2010). Low intra-group cohesiveness is significantly related to perceptions of inter-group conflict (Labianca, Brass et al. 1998). The implications for ISDP organisational complexity are that projects that involve teams made up from diverse groups, have increased organisational complexity as diversity increases likelihood of conflict and makes resolution more difficult.

In summary the potential for a cooperative resolution is dependent upon certain determinants of conflict behaviour; these include outcome interdependence, importance, acceptability of conflict, temporality, communicative factors, subject characteristics, power, trust, culture and group homogeneity.

Insert Table 2 here

4.3 Objects of Conflict

As was stated in the previous subsection the extent to which a project will exhibit socio-organisational complexity is dependent on the nature of stakeholder interactions required to bring the project deliverable into existence. Whilst the previous subsection identified the factors that affect cooperative resolution, this subsection identifies the factors that are responsible for producing a potential for conflict. Our literature survey identified two potential sources of conflict: activity-oriented conflict and relational conflict. Activity conflict can be further divided into task conflict, process conflict and role conflict where values, satisfaction, status, capabilities, resources and time are all important objects of conflict. Relational conflict is associated with the relationships between parties and the objects of conflict, the procedures that determine the relationships between subjects or emotions one subjects feels for the other.

4.3.1 Activity oriented interference

Activity oriented interference is associated with the fulfilment of aims, objectives and responsibilities and is where the trigger of the conflict is either a subject's current or future behaviour, or demands for behaviour. Activity oriented interference may be divided into three subtypes of interference: task; process; role. Each of these types is a potential source of disruption to an ISDP as a stakeholder can perceive a change to be brought about by an ISDP as interference with their fulfilment of aims, objectives or their role and thus enter into conflict.

Task conflict is one of the most commonly identified types within the CS/IS literature (Jehn 1995; Jehn 1997; Janssen, Vliert et al. 1999; Jehn and Mannix 2001; De Dreu and Weingart 2003; Tjosvold, Poon et al. 2005; Korsgaard, Soyoung Jeong et al. 2008; Moeller and Zhang 2008). There is much agreement about its primary focus but researchers draw boundaries around the concept in different ways. For example (Janssen, Vliert et al. 1999), p119) states that "Task conflict in team decision making refers to disagreements about the work to be done including issues such as the allocation of resources, application of procedures, and the development and implementation of policies." Whilst (Jehn and Mannix 2001), p238) states that "Task conflict is an awareness of differences in the viewpoints and opinions pertaining to a group task. […] it pertains to conflict about ideas and differences of opinion about the task". Notice that Janssen includes not only conflict about what work is to be done but also allocation of resources and to how to do it. In contrast, Jehn limits the concept to ideas and opinions about the task. Whilst the boundary of the definition is still an open question in Applied Psychology and Management, this survey promotes the usage of a common language to ensure comparability of results and suggests task conflict should be regarded as conflict over what to do (e.g. the aim or goal) and should not include resource allocation or conflict over how to achieve the aim or goal, e.g. the objectives.

The term process conflict (Jehn 1997; Jehn and Mannix 2001; Jehn and Bendersky 2003; Greer and Jehn 2007) is often used to add granularity to the study of conflict. It is concerned with conflict surrounding task accomplishment, e.g. a group may be assigned the task of reducing operating costs by 10% and therefore process conflict could arise about how to do that. For example (Jehn 1997), p540) describes it as "conflict about how task accomplishment should proceed in the work unit, who's responsible for what, and how things should be delegated".

Process conflict includes disagreements about assignments of duties or resources (Jehn 1997; Jehn and Bendersky 2003). This definition of process conflict, we believe, conflates two separate yet important issues. The first is developing a strategy for how to do the task. The second is implementing the strategy by assigning

who is to perform certain roles in the task. Therefore, this paper proposes that process conflict should be restricted to conflict over strategies for how a task should be performed and that conflicts over implementation (e.g. who and assignment of resources) should be dealt with under its more natural home - role conflict.

Role conflict is another term used to inject granularity into the study of conflict (Rizzo, House et al. 1970; Kelloway and Barling 1990; Netemeyer, Johnston et al. 1990; Tubre and Collins 2000; Gong, Shenkar et al. 2001; Behfar, Peterson et al. 2008). In this context a role is a set of rights, duties, privileges, powers, liabilities and immunities (Liu 2000). Rizzo (1970) identifies four types of role conflict.

1) Conflict between the focal person's internal standards or values and defined role behaviour

2) Conflict between the time, resources and capabilities of the focal person and defined role behaviour

3) Conflict between several roles for the same person which require different or incompatible behaviour

4) Conflicting expectations and organisational demands in the form of incompatible policies, conflicting requests, and incompatible standards of behaviour

The first and second types of role conflict identify a misfit between an individual and their roles. The first is a clash of values/standards, the second is a clash between their personal capabilities and the role(s) and resources they have been assigned. The third and fourth types identify bad design, or implementation, of roles such that an actor has been assigned incompatible roles or the assessment of their performance employs incompatible metrics.

Studies of information systems development confirm that stakeholder agendas, identities and values are a source of conflict within ISDPs. (Butler 2003) illustrates that conflicts between groups emerge and create a high degree of institutional tension when the IT system is used to implement organisational capabilities that are not perceived as being in the interest of certain groups. For example, Butler (2003) found that the introduction of an e-commerce capability was perceived by certain groups as an interference with tried and tested face-to-face methods of sales and thus a threat to their status within their organisation. (Ellingsen and Monteiro 2003) provides a similar account from the deployment of a hospital patient record system which resulted in different clinical coding systems being used across different systems due to doctors and administrators having conflicting needs for coding. (Lawrence 2006) supports this with an account of conflict with the role of a software

development team within a large distributed e-Science project. The team were invited to join the project to develop software to support meteorologists. However, they received their funding for this work from a research grant creating role conflict. The research grant was given to the group assigning them the money so they could pursue the role of researchers whilst in contrast the group were granted a role into the project to perform development work. This created a perceived incompatibility between the roles expected of them by the funders and the project managers and collaborators.

Stakeholder agendas, identities and values have been studied in detail during the development and testing phase of ISD (Sonnenwald 1995; Cohen, Birkin et al. 2004; Zhang, Dhaliwal et al. 2008). The sources of conflict between developers and testers comprise primarily of differences of: identity leading to a perceived asymmetry of status; differences in perceptions/expectations of appropriate extent of testing; limited resources.

Stakeholder agendas, identities and values are also a source of conflict in the context of software evaluation and system deployment (Joshi and Rai 2000; Wong 2005). Users and developers despite wanting similar consequences from software (e.g. look good at job, less stress, flexible, accurate) were motivated by different values and believed that different software characteristics would deliver those desired consequences (Wong 2005). Within system deployment it is known that software that attempts to make employees do activities which they perceive not to be part of their role, or incompatible with their values, causes role conflict and is negatively correlated with employee satisfaction (Joshi and Rai 2000).

4.3.2 Relational Interference

Relational interference is associated with the relationships between subjects. The object of conflict is normally identity related or the procedures that determine the relationships between parties. This can be broadly categorised into two types: relationship and procedural injustice.

Relationship interference is referred to in many papers discussing conflict in organisations and IT systems development e.g. (Pinkley 1990; Jehn 1995; Jehn 1997; Labianca, Brass et al. 1998; Janssen, Vliert et al. 1999; Jehn, Northcraft et al. 1999; Pelled, Eisenhardt et al. 1999; Simons and Peterson 2000; Jehn and Mannix 2001; De Dreu and Weingart 2003; Jehn and Bendersky 2003; Tjosvold, Poon et al. 2005; De Dreu 2006; Korsgaard, Soyoung Jeong et al. 2008; Moeller and Zhang 2008). Relationship conflict, also referred to as person conflict, refers to the occurrence of identity-oriented issues, whereby personal or group beliefs and values come into play. Such personalized disagreement typically includes tension, animosity, and annoyance among team

members"(Janssen, Vliert, 1999, P119). In other words, perceived incompatibilities between individuals or groups become the object of conflict rather than tasks that need to be performed.

Procedural injustice refers to conflict over procedures that determine the relationships between parties. According to (Brown 2000) it is a "a feeling that the methods for deciding about and allocating material goods are unfair independently of the in-group's actual outcomes". This paper proposes that procedural injustice is not limited to material goods but also social status, time and finite organisational resources such as money or manpower. A second type of injustice is distributive injustice where parties perceive the distribution of benefits/losses to be unfair such that they enter into conflict with the those perceived to control distribution of benefits/losses (Brown 2000).

4.4 Subjects of Conflict

The literature survey identified three levels of conflict; the individual, intra-group and inter-group. Each level is qualitatively different from the other as different 'social forces' influence each of the levels. This section describes each level of conflict and provides examples of their influence on ISDPs.

4.4.1 Individual - Level of Conflict

The individual level is concerned with conflict bounded within an individual. These conflicts are all role conflicts. Understanding role conflict is important to the development of complex IT systems because systems that do not respect existing roles will generate user dissatisfaction and resistance. In some situations, changing existing roles may be desired however doing so without careful consideration can result in the failure of IT projects.

Individual role conflicts can be caused by an individual being assigned multiple roles with incompatible activities or being assigned a role that is incompatible with their values or with their satisfaction. For example, (Lapointe and Rivard 2005) observed that the implementation of an electronic medical record (EMR) interfered with physicians' values and identity as it required them to perform work that they perceived to be secretarial work. This conflict escalated and the system was eventually abandoned due to stakeholder resistance.

Individual role conflicts can also be caused by an incompatibility between an individual's resources, capabilities and their role. For example, it has been widely documented that electronic document management

system do not deliver their expected benefits at user groups find them to be too difficult and time intensive to use (Munkvold, Paivarinta et al. 2006). These individual level conflicts may result in conflict with other team/group members to secure more resources, or adjust roles, this leading to the formation of groups or coalitions of disgruntled individuals to oppose the project (Lapointe and Rivard 2005).

4.4.2 Intra-group - Level of Conflict

The intra-group level is concerned with conflict within a group. Intra-group conflict is highly relevant to the development and deployment of complex information systems as it is a process that requires a high degree of communication and cooperation between individuals working within groups. An example of intra-group conflict comprises engineers disagreeing over the approach necessary to design a software product (Klein and Lu 1989).

Activity oriented conflicts in the intra-group context involves conflict between individuals over performing activity. Task conflict at the intra-group level is conflict over what to do to achieve aims. For example, a proposed new IT system can trigger task conflict between users and the system designers as the users can perceive that: their involvement with the project interferes with their everyday task fulfilment; or that the project product when deployed will interfere with their everyday task fulfilment e.g. workload (Klaus, Wingreen et al. 2007).

Process conflict at the intra-group level is conflict over how to implement the approach agreed upon by a group. For example, a group of stakeholders may agree on the functional requirements of the system but disagree on the non-functional characteristics (Boehm 1996). Role, values and satisfaction conflicts also occur at the intra-group level. For example, stakeholders may hold differing values towards privacy and surveillance in the workplace. When negotiating system requirements, different members of the same stakeholder group can enter into conflict over which value system to adopt. Role and time/resources and capabilities conflicts may also occur. For example, the accounts department may be requested to test a software package without being given appropriate resources (e.g. skills, time, budget). This can result in certain team members being dissatisfied as they feel they have additional workload and insufficient training to perform the task and could potentially cause conflict with other team members or groups as they attempt to change the situation e.g. spread workload or demand more time to complete other work. 'Multiple role conflict' occurs where members of a group have been assigned incompatible activities to accomplish. For example one team member may be a software developer whilst another a software tester (Zhang, Dhaliwal et al. 2008). The developer is given the activity of delivering a certain work-package by a particular date. The tester is given the activity of sending back any work that does not

meet a certain standard. The developer could perceive the tester as interfering with his task of delivering the software on time as he creates him rework. It may be observed that task conflict and multiple role conflict at the intra-group level are similar. The important distinction to acknowledge is that whilst task conflicts can be trivial in importance this is less so with role conflict as someone's role is central to their social status, social power and identity.

Relational conflict refers to conflict over relationships between individuals in the group/team. This can occur because one individual has negative emotionality towards another due to prior conflicts or because an individual is perceived as being responsible for injustices such unjust delegations of status, roles within the group or resources. A common example of this is the relationship between developers and testers. As the schedule slips testers are given less time to complete their work resulting in tensions (Zhang, Dhaliwal et al. 2008).

4.4.3 Inter-group - Level of Conflict

The inter-group level is concerned with conflict between groups such that a person's group identity influences their behaviour or other peoples' behaviour towards them. These conflicts can be action-oriented or relational in nature. However in contrast to intra-group conflict, inter-group conflict is heavily intertwined with group identities and is often latent within an organisation. Intergroup conflict is commonly observed in ISD projects that attempt to significantly change stakeholder's roles and work practices. For example the LASCAD project, an IT enabled work transformation project, where ambulance crew, control room workers and management entered into prolonged conflict that even involved union representatives (Page, Williams et al. 1993; Beynon-Davies 1995). Or Chiasson and Dexter's (Chiasson and Dexter 2001) account of the implementation of an electronic patient record that revealed a latent conflict between the clinic's coordinator, the clinic's research and development group and the hospital physicians that resulted in the implementation of the system only after the firing on the coordinator.

Three factors impacting group conflict have been identified:

i) Political manipulation - the potential perception that one group is attempting to use the situation to further their group interests such as improve relative status between groups or challenge another group's values or identity. This tends to focus the object of conflict away from tasks towards status issues.

ii) In-group evaluative bias – groups tend to be biased such that they believe they are better than their perceived counterparts (Brown 2000). For example an in-group might concede that the out-group is better at certain aspects however the in-group will tend to rate itself as better at what they perceive to be the more important characteristic which overwhelms the out-groups superior aspect. This bias means that groups have difficulty accepting solutions from other groups. In low status groups the opposite bias is demonstrated such that out-group is favoured over in-group. It has also been observed that groups overestimate differences between groups more commonly than underestimating them (Robinson, Keltner et al. 1995) thereby making differences appear more significant than they may otherwise be leading to conflict.

iii) Ingroup-vs-outgroup distributive bias. When there are rewards to be distributed there is a natural bias to distribute more of these to in-group than out-group. This is not so with distribution of penalties where distribution appears fairly even (Brown 2000). This again can lead to/amplify conflict due to perceptions of injustice.

Insert table 3 here

In summary there are three levels of conflict: the individual; intra-group; and inter-group. Each level is qualitatively different from the other as different kinds of social forces are at work within each. In order to understand the organisational complexity (interactions between people and groups) of an ISDP these three levels must be understood in a systematic and structured manner.

5 REVISTING PRIOR MODELS OF ISDP COMPLEXITY

The Multi-level model of conflict extends our understanding of ISDP complexity. Previous discussions by Xia (Xia and Lee 2005) and Maylor (Maylor, Vidgen et al. 2008) placed considerable emphasis on the stakeholders as important sources of complexity. However the nature of stakeholder interactions was left for further study as no underlying theoretical models were provided to structure academic, or practitioner understanding, of how to perform interventions to ameliorate socio-organisational complexity. The multi-level model of conflict has extended our understanding of structural project complexity by (See Figure 2 & Figure 3): i) going beyond stakeholders as organizational elements and identifying assemblages of relationships between culture, norms, power, stakeholder characteristics, group identities, individual/group/organizational interests; ii) providing a

theoretical model that connects socio-organisational complexity to stakeholder interactions and ISDP performance; iii) providing a theoretical model of socio-organisational complexity that comprises socio-organisational elements at a granularity that is realistic for practitioners to use in-order to guide their management of project complexity.

Insert Figure 2 here Insert Figure 3 here

Figure 2 shows that the relationship between socio-organisational complexity and ISDP performance is mediated by the complexity of stakeholder interactions. The complexity of stakeholder interaction, according to this model, consists of the potential for conflict and the potential for resolution. The potential for conflict, as discussed in Section 4, is composed of the initial conditions, the number of stakeholder interactions, the number and types of object of conflict present, the subjects (individuals, groups, organisations) involved in the interactions and their characteristics. The potential for resolution, as discussed in Section 4, is represented as the situational characteristics and the subject characteristics. The relationship between ISDP performance and the complexity of stakeholder interactions is hypothesised based upon the work of Xia and Lee (Xia and Lee 2004) and Barki and Hartwick (Barki and Hartwick 2001). Xia and Lee demonstrated that organisational complexity when operationalised as project management control over resources, insufficient user support, insufficient staffing, inappropriate knowledge/skills and insufficient top management support significantly degrades delivery time, cost, functionality and user satisfaction. Similarly Barki and Hartwick demonstrated that perceived conflict is negatively associated with adherence to budget, schedule and specification whilst satisfactory conflict resolution influences attitudinal outcomes such as end-user satisfaction, perceived quality and overall success. We interpret these findings reveal a relationship between complexity of stakeholder interactions and schedule, budget, scope and end user satisfaction. Figure 3 shows a decomposition of the types of entity that compose the components of potential for conflict and potential for resolution, as described in Section 4, thereby providing a more granular view of the socio-organisational components represented in Figure 2. For instance, it can be seen that the objects of conflict as described in Figure 2 are decomposed in Figure 3 as activity oriented objects and

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relational oriented objects that can be further decomposed into task, process, role, relational, and perceived injustice.

The value of the multi-level model (as presented in Figure 2) is that it can sensitise practitioners to sources of socio-organisational complexity and inform practitioners' management of complexity at many stages of an information systems lifecycle. The model is able to offer insight into many stages of the lifecycle because stakeholders (including the project team) are required to interact and cooperate for almost all of these activities to occur. At the systems conception stage, socio-organisational complexity can be analysed to understand: i) whether sufficient stakeholder cooperation/support can be generated for the project to be resourced and supported by senior management; ii) obtain appropriate cooperation and support from user units in-order for requirements and testing to meaningful; iii) and identify appropriate external contractors/vendors that would not be in a position to be exploitative. At the requirements stage, socio-organisational complexity can be analysed to anticipate and avoid potential conflicts between stakeholders' requirements. Throughout the development and maintenance cycle, the affect of changes to stakeholder interests, or the reconfiguration of stakeholder coalitions, can be understood in terms of its impact of project performance.

From a methodological perspective the model opens the IS research community and practitioners to applied psychology's vast pool of quantitative measurement instruments and approaches that can be used to explore the relationship between the components of ISDP organisational complexity and ISD performance or factors known to influence ISDP performance such as system quality, system use, and user satisfaction. The model is also useful in guiding action research / design science (Baskerville and Wood-Harper 1996; Baskerville and Myers 2004; March and Storey 2008) as it provides a model of the sources of socio-organisational complexity and the kinds of actions that can be performed to ameliorate the situation. Overall it can help drive a mixed methods approach by providing a framework of constructs for the generation of multi-level structural models (Burton-Jones and Gallivan 2007) that link ISDP complexity and ISDP performance whilst simultaneously providing constructs that are at an appropriate granularity for informing practitioners and performing action research.

6   CONCLUSION & FUTURE WORK

A multi-level conflict oriented approach to socio-organisational complexity reveals the relationship between granular aspects of socio-organisational complexity, which are manageable by practitioners, and their affect on ISDP (information system development project) performance. This is significant, as prior models of ISDP

complexity do not describe the relationship between aspects of ISDP organisational complexity and ISDP performance at a sufficient enough granularity to enable the active management of the phenomenon by practitioners or indeed action research. The multi-level model specifically illustrates the relationships between socio-organisational factors and ISDP performance by providing a model that illustrates that the complexity of stakeholder interaction (potential for conflict / potential for resolution) mediates ISDP performance.

This model was generated from a multi-disciplinary literature survey covering the past 20 years of research from information systems, management and applied psychology. Our literature survey highlights a need for further research into conflict associated with ISDPs. At present there is a lack of IS specific work that discusses the dynamics of conflict over time and its affects on the different stages of an ISDP's lifecycle. Another area for further exploration is the dynamic relationship between conflict at the individual, intra-group and inter-group levels and how conflicts can escalate/de-escalate between levels and its affect on ISDP performance. This work would be particularly valuable, as it would provide insight into the dynamics of ISDP socio-organisational complexity. Another interesting avenue for exploration is to consider the relationship between conflict in ISD projects and resistance to ISDPs as there is a considerable body of work that may offer insights that are transferable to studies of socio-organisational complexity.

Another matter of consideration for the community is to agree upon a definition of conflict as the term is being conflated with the notion of inconsistency and in some papers remains undefined despite being the focus of study making comparison amongst work difficult. We propose that inconsistency describes a situation when two statements are logically incompatible, like $P = 1$ and $P \neq 1$, whilst conflict, broadly speaking, describes a social situation when two, or more, interdependent parties perceive the other as behaving in a manner that is incompatible with their interests.

There are many opportunities to extend the multi-level conflict model. The multi-level conflict model itself can be validated and extended. Validation could be approached from either a quantitative or qualitative perspective e.g. structural equation modelling or action research. Quantitative methods could be used to determine the extent that each aspect of conflict affects organisational complexity and ISDP performance therefore providing practitioners with guidance as to which aspects of conflict to prioritise in their management. Action research could be used to validate and refine the model in a practitioner setting. The model itself could be

extended taking into account the interactions between individual, intra-group and inter-group levels as well as addressing dynamic ISDP complexity by offering a more complete account of conflict unfolding through time.

Another route for future work is to package the model into an ISD project feasibility analysis approach. The development of a visual approach to modelling the network of stakeholder interactions could be beneficial as this would help sketch the network of stakeholder interactions required for a project to succeed. Such a sketch could be used to review the viability of the network of interactions required for a project to be successful, to lobby project stakeholders by demonstrating how a project meets their interests, or to get a handle on the organisational complexity of developing or operating an information system.

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FIGURES

Figure 1 – The structure of Section 4

Figure 2 – The affect of Socio-organisational Complexity on ISDP Performance
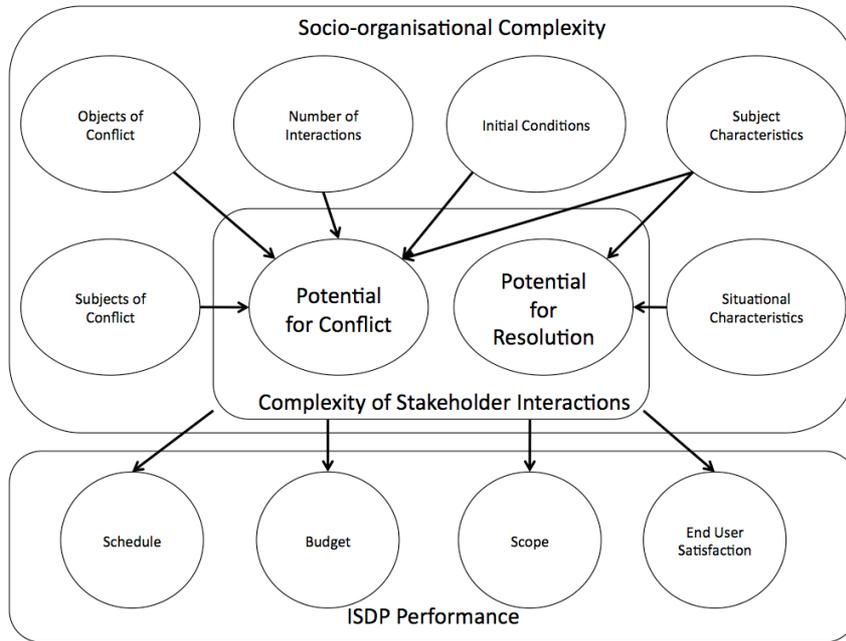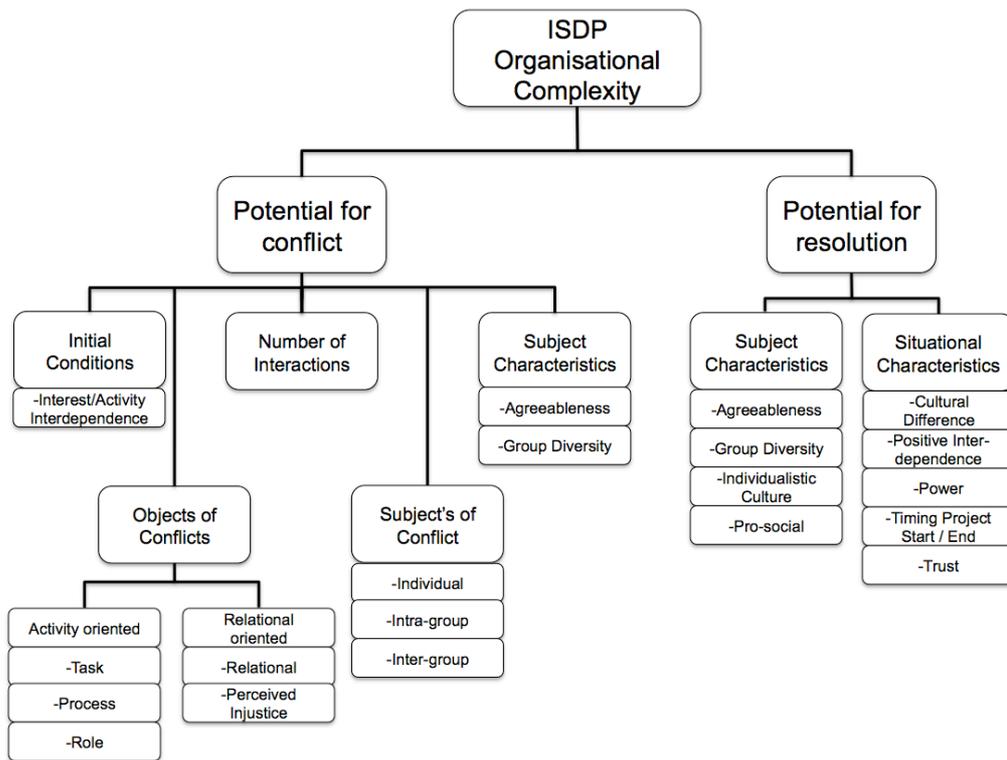
Figure 3 – A Decomposition of ISDP Organisational Complexity using a Conflict approach

Tables

Table 1 - The structure of a cooperative situation

	Negative Goal Interdependency	Goal Independence	Positive Goal Interdependency
Action Compatibility	Competition	Disinterest	Cooperation
Action Interference	Competitive Conflict		Cooperative Conflict

Table 2 – Summary of factors that affect cooperative resolution

Factor Type	Determinant of Outcome / Intensity	Affect	Org. Complexity
Outcome interdependence	Negative interdependence between Stakeholders	Reduced likelihood of resolution	Increases
Importance	High importance of issue to Stakeholder	High Intensity	No change
Acceptability Norms	Perception that acceptability of conflict is high	High Intensity	No change
Power	Equal power between stakeholders (intra-org) Unequal power between stakeholders (inter-org)	Reduced likelihood of resolution	Increases
Ownership	Strong ownership of object of conflict	Reduced likelihood of resolution	Increases
Temporal	Conflict at the start or end of a project	Reduced likelihood of resolution	Increases
Communicative barriers	Communication quality between stakeholders is below average e.g. Specialist knowledge, different norms.	Reduced likelihood of resolution	Increases
Agreeableness	Subject's exhibit conflict behaviour of low agreeableness	Reduced likelihood of resolution	Increases
Pro-social	Subject's do not exhibit pro-social conflict behaviour	Reduced likelihood of resolution	Increases
Trust	Non-trusting behaviour	Reduced likelihood of resolution	Increases
Cultural Diversity	Subject's of different cultures	Reduced likelihood of resolution	Increases
Individualistic Culture	Subject priorities individual over the collective	Reduced likelihood of resolution	Increases
Team / Group Diversity	Team/Group members made up from diverse professional or cultural backgrounds	Reduced likelihood of resolution	Increases

History of	History of dislike / unresolved conflict	Reduced likelihood of resolution	Increases
conflict			

Table 3 – Summary of factors that affect potential for conflict

Conflict	Individual	Intra-group	Inter-group
Task	N/A	Disagreement over what to do to achieve aims	
Process	N/A	Disagreement over how to accomplish task	
Relational (Procedural/ Distributive Injustice)	N/A	Unjust delegations of status, duty or resources **within** the group	Unjust delegations of status, duty or resources **between** groups
Role (Time, Resources and Capabilities)	Incompatibility between required activity and practical constraints		
Role (Values, Status and Satisfaction)	Incompatibility between required activity and an **individual's** values, status or satisfaction	Incompatibility between required activity and **group** values, status and satisfaction	
Role (Multiple)	An **individual** is assigned multiple roles with incompatible activities or assessment metrics	A **group** is assigned multiple roles with incompatible activities or assessment metrics	
Relational (Incompatibility between actors)	N/A	Negative emotionality between **individuals**	Negative emotionality between **groups**