

7-1-2013

The Socio-Technical Change And Psic Models As Lenses To View Three Consecutive Public Sector Is Projects

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Recommended Citation

Heiskanen, Ari; Hekkala, Riitta; Newman, Mike; and Eklin, Merja, "The Socio-Technical Change And Psic Models As Lenses To View Three Consecutive Public Sector Is Projects" (2013). *ECIS 2013 Completed Research*. 35.

http://aisel.aisnet.org/ecis2013_cr/35

THE SOCIO-TECHNICAL CHANGE AND PSIC MODELS AS LENSES TO VIEW THREE CONSECUTIVE PUBLIC SECTOR IS PROJECTS

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Abstract

The object of this qualitative study was to use Leavitt's (1965) socio-technical change model and the Punctuated Socio-technical Information systems Change (PSIC) model proposed by Lyytinen and Newman (2008) as twin approaches to illustrate three closely related large Information Systems (IS) projects called Tango I, Tango II and Tango III that were implemented and developed by two consortia of several public user organisations during a 10 years period to replace a variety of legacy systems. The study demonstrates how the management of the implementation process and interactions between the work process and build process shaped the different kinds of outcomes. This study demonstrates the utility of a pictorial depiction of a complex project. Findings from the case study are analysed using the punctuated process model and implications for academics and project managers are discussed.

Keywords: Socio-technical system; social process; punctuated equilibrium; information system development; success and failure; change management; inter-organisational public sector systems; organisational collaboration in public sector IS development

1 Introduction

It has long been recognized that large information systems (IS) implementations in organizations may have high risks (Markus and Tanis 2000). New complex business processes require massive re-configuration efforts of both software and work procedures (Poston and Grabski 2001). In contrast, well-implemented IS projects can result in significant cost reductions, improved management reporting and control, and increases in efficiency by offering timely access to accurate information (Markus and Tanis 2000). IS development (ISD) has long been seen as a socio-technical change process (e.g. Kwon and Zmud 1987; Leavitt 1965, Newman and Robey 1992). The process model presented by Newman and Robey (1992) is frequently cited to describe the events in the process itself and relate those events to outcomes. Lyytinen and Newman (2008) argue that studying the whole project implementation process can help researchers to get a richer picture. The punctuated equilibrium model has been seen as a very good theoretical framework to explain organisational change (Newman and Zhao, 2008; Newman and Robey, 1992; Lyytinen and Newman, 2008).

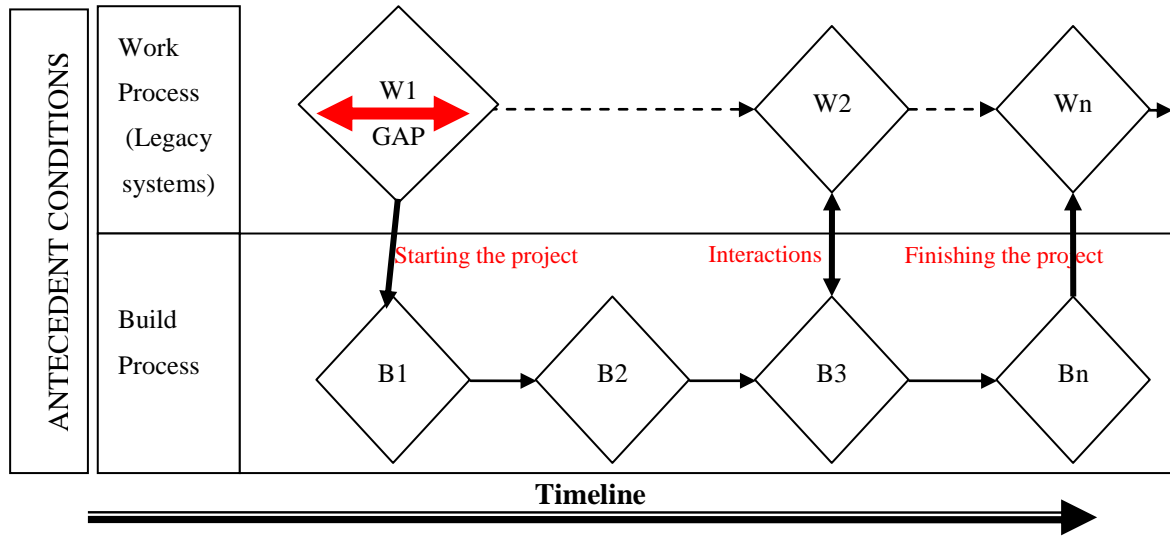
In this study, Leavitt's (1965) socio-technical change model is used to identify the relationships between structure, actors, technology, and task and their effects on IS implementation. We also show how the Punctuated Socio-Technical Information System Change (PSIC) model (Newman and Zhao, 2008; Lyytinen and Newman, 2008) can depict a complex, critical longitudinal series of events in a concise format and how the PSIC model deepens our understanding of ISD research and practice. The parallel processes are exhibited by the building events and the work (or legacy) events in addition to focusing on points of interaction. A critical event that occurs during the project (i.e. in the building system) produces a gap between, say, the task and the technology. Clearly, not all events are critical but we designate an event as critical if it produces a gap in the socio-technical entities. We also include the elements of context (organisational and beyond) which may interact with the build and work processes as these may also be sources of critical incidents. Sometimes the gap becomes visible after a longer period of time after the critical event. We call these gaps emergent.

Our research question is: *How can a combination of a socio-technical change model and PSIC model be used to illustrate the social dynamics of ISD in three collaborative public sector IS projects?*

The paper is organized as follows. In the next section, we present a summary of the relevant literature to this study. The third section outlines the research methodology. The fourth section describes a focus of this research, three consecutive IS projects that were implemented by two consortia. The fifth section describes our findings. The sixth section discusses our findings, and the future research possibilities. We conclude our study with a brief summary of our contributions and suggestions which may be helpful to scholars in IS research as well as practitioners involved in similar IS projects.

2 Literature review

The relevant literature for this paper describes and explains the PSIC model (Newman and Robey, 1992; Robey and Newman, 1996; Newman and Zhao, 2008; Lyytinen and Newman, 2008). Newman and Robey (1992) claimed that ISD can be 'conceived as a sequence of episodes, punctuated by encounters, that follows patterns established in previous development work'. The aim of the process models is to focus primarily on social change activities. The very important focus is on sequences of critical incidents that link antecedent conditions with outcomes within contexts (*basic process model*) (Newman and Zhao, 2008; Lyytinen and Newman, 2008). Lyytinen and Newman (2008) argue that there will be occasions or gaps where changes will make the actors restudy and change assumptions about how work is accomplished or systems are built. A new project may involve many different punctuations, first in the build system when the project is established, and later in the work system if and when the new information system replaces the legacy system. The punctuation model (Figure 1) shows a successful punctuation at the start of a new project and a change in the deep structure.



Note: W (Work Process), B (Build Process).

Figure 1. The Contextual Punctuated Process Model (showing a successful punctuation. Adapted from Newman and Zhao, 2008; Lyytinen and Newman, 2008)

Newman and Zhao (2008), Pan et al. (2006) and Lyytinen and Newman (2008) introduced the **parallel** process model using the socio-technical entity concept (Figure 1). By using the model it is possible to examine the organisational work process, the IS building process and their interactions with the environment simultaneously. Changes in existing organisational routines or/and work processes can become critical incidents which in turn will affect the project implementation process. The parallel process model considers that the build and work processes exist and interact with each other in parallel until the end of the project life cycle when the legacy system is replaced with the new one or the new system is abandoned. There are two types of socio-technical configurations, one associated with the build process and another with work or legacy process. For example, task is defined in two ways: one is the task of building the information system while the other is defined by the existing work practices. In summary, shaped by an historical context (antecedent conditions), existing socio-technical arrangements continue until a critical incident (planned or, usually, unplanned) takes place which produces a gap between one or more of the socio-technical (S-T) pairs. This is an unstable state and actors, when they recognise the problem, may attempt to design interventions which may remove the gap successfully or may fail and even result in multiple gaps (i.e. unintended consequences). In contrast, some interventions (planned or unplanned) may produce punctuations (or second order changes) that produce a new deep structure. Assembling the building team and delivering the final system to replace the existing work processes are both examples of common punctuations but there may be also internal or external sources, for example a decision to outsource development work or the project manager leaving the project.

3 Methodology

This study is a qualitative and interpretive case study. Klein and Myers (1999: 73) claim that the relationships between people, organisation(s) and technology are constantly changing, and as a consequence, interpretive researchers are trying to make sense of a moving target. Our data consist of archived folders gathered over the years as the first and fourth authors' personal project documentation, notes, contracts, memos of meetings and e-mail messages. With the aim to understand organisational background, past IS conditions, current initiatives, future vision, and the driving forces, documentation analysis and observations were added to the research data. **Data Analysis:** *In step one*, the data are used to produce a basic narrative of the overall process, the storyline: what happened; when did it happen; what went before; what were the outcomes; and what were the influences? During this first analytical step, the antecedent conditions for the project implementation were also identified.

From the storyline, it was possible to identify the essentials of the development process (Figure 2). *In the second step*, we looked for critical incidents, separating them into work and IS building events for our first project that conditioned two later ones (see next section). We also looked for interactions between the processes. *For step three*, we used the punctuated equilibrium model to analyze these critical incidents. Essentially, the model depicts project (i.e. build activities) and work life as relatively stable (evolutionary) periods punctuated by shorter, turbulent periods which are capable of influencing the project's trajectory. The critical incidents are associated with these revolutionary periods. *Fourthly*, we interpreted the data to draw the individual socio-technical diagrams, identifying the four components and any gaps between them. The authors grouped those identified events into the four categories according to Leavitt's model (1965), namely, task, actors, technology, and structure. Subsequently, gaps (e.g. Lyytinen and Newman, 2008) between the four components were identified. *In the fifth step*, we analyzed organizational contexts for their interactions with the processes. Finally, *for the sixth step*, combining data from steps one to five, we constructed the overall process diagram (see Figure 3). With the identified events and phases in relation to the IS project, the sequential patterns are arranged in chronological order via many iterations between the steps. These results were used in the analysis of the transition from the second project to the third.

4 The research site and background

Table 1 presents three collaborative IS projects¹ which followed each other. Figure 2 presents the main events, problems and strategies of the projects in order to help reader to understand the findings.

The IS projects, and organisations involved	The main phases of the projects. In 1995 when TANGO I began, there was no nation-wide IS for the application area. Therefore each organisation had its own IS.
<p>TANGO I (1995-2004): Specification, design & implementation project with testing, adoption and maintenance phases.</p> <p>Organisations: Originally five public sector user organisations (Alpha, Bravo, Charlie, Echo, Golf; 13 organisations in 2004), feasibility study consultant (Sammy), two software vendors (Victor and Yankee)</p>	<p>The most important reasons for cooperation of five public sector user organisations in 1995 were expense cuts both in the development of IS and in maintenance, the lack of skilled staff, dependence on a single or few individuals, the needs to reform old systems especially in view of Y2K, and cuts to general public funding of the organisations. The idea of developing a joint system received support from the management of organisations, and so Juliatt consortium was formed in 1995. More organizations joined to the consortium, totalling 13 in 2004. The first newcomer was Zulu in 1997; Zulu had a very problematic implementation process starting in late 1999.</p> <p>Victor and Yankee were selected in the spring of 1996. Victor had experiences about the same kinds of implementations and Yankee had more experience on architectural issues. Yankee was the main vendor and Victor was its subcontractor. Specification phase: (1995-1996), design phase: (1997-1998), implementation phase: (Feb 1998 ->), Testing phase: (Feb 1999->), The joint maintenance phase: (1999-2000). Use and further development (2000-2004). More than 3000 software changes or corrections have been made to the system during the years 1999-2004.</p>
<p>TANGO II (2002-2003): Specification, interface pilot and planning project for an IS to support client mobility.</p> <p>Organisations: Ministry, Romeo, Juliatt, Yankee, Oscar, Quebec, Alpha</p>	<p>Ministry funded the project via Juliatt and Romeo (consortium of 20 public sector organisations, founded in 2000). Romeo and Juliatt operated in closely related areas. Juliatt suggested to Ministry that they could do cooperation with Romeo in TANGO II. Juliatt had a very poor financial situation and the cooperation between Romeo and Juliatt would help Romeo as well. All Juliatt members were also members of Romeo. Oscar and Yankee: Suppliers of the software. Quebec: Expert consultants. Alpha: User Organization. Because of problems in TANGO I and II, Romeo, Juliatt, Yankee and Oscar were not included in TANGO III.</p>
<p>TANGO III (2004-2006): The aim of the project was to carry out a pilot test before establishing the TANGO II mobility IS at the national level.</p> <p>Organisations: Alpha, Bravo, Golf, Delta, Echo, Sierra, Quebec, Ministry</p>	<p>Alpha, Bravo, Golf: User organizations. Ministry gave a funding for the project via Alpha. Delta: User organization with different legacy IS, a part of the project because Ministry suggested it. Romeo had a representative in the TANGO III project group and steering group, but as a consortium it was not a project actor. Echo: a project management organisation, in charge of the project, also having a strong interest to do research work. Sierra and Quebec: It was the aim that these suppliers will implement the project. They won the bidding competition. Sierra supplied the software solutions for the project. Quebec acted as an expert (finished collaboration before the project was over).</p>

Table 1. Three consecutive information system projects.

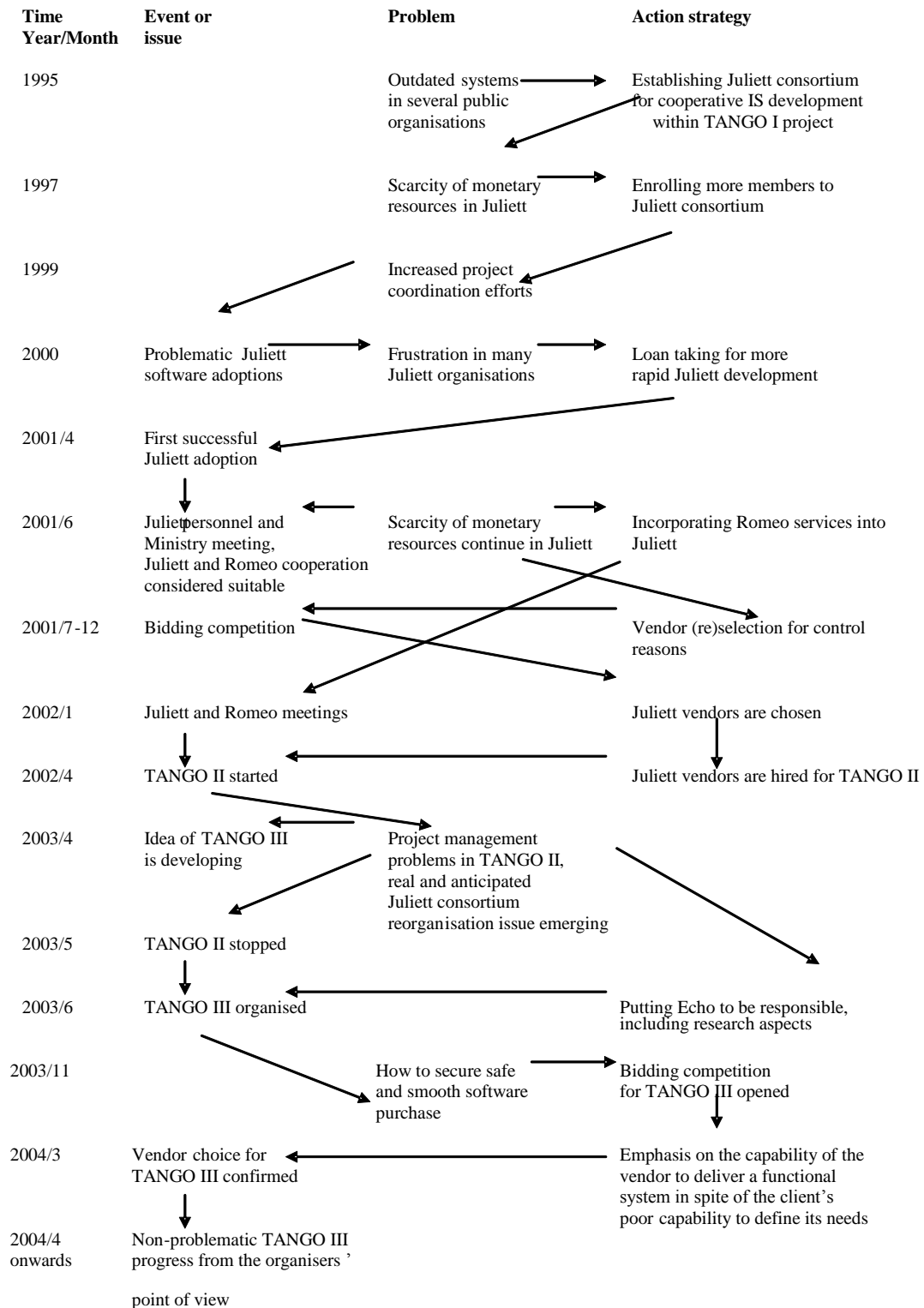


Figure 2. Events, problems and main strategies during three ISD projects.

5 Findings

This section contains our selection of the important events and periods, as well as their brief description. Through our selection we show how the gaps between the **S-T pairs** evolved over the

years. Below, **W** means work system and **B** means build system. We use the PSIC model in order to uncover the background and reasons from TANGO I for the organisational changes observed in the transition from TANGO II to TANGO III. Essentially several major actors were changed: software vendors were replaced with new ones, the two consortia were replaced with four user organisations, and the project leadership and management were obtained from Echo; the previous project manager was from Romeo. Our PSIC analysis of TANGO I reveals the problems that conditioned the change from TANGO II to TANGO III, in addition to the problems of TANGO II. Obviously the reorganisation was successful, because the progress of TANGO III was considered smooth and successful by its key participants. **W1**: The preceding period: the times before joint system development (before December 1995). The members of Juliett consortium were using their own systems, mostly developed within their own organisations. In the various meetings between the organisations' IS staff, discussion also arose on the development of a joint system. **New gap**: task vs. technology in the work system. In common with many legacy systems the old systems were inadequate for the tasks.

B1: The first Juliett consortium agreement was signed in December 1995. The signing of the first consortium agreement marked the start of official cooperation and a feasibility study for the system and also provided the framework for the kind of system cooperation that had never existed between these public sector user organisations. **B2**: Design phase (April 1997 – January 1998). In the planning phase general satisfaction with the joint understanding reached by the project group was preserved. In the design phase some user groups took part in the activities of the project group, but most of the responsibility remained with the project group. Documentation was distributed to be commented inside the organisations, but they did not open up very well to anyone for whom systems development was a mystery. For many end users the object-modelling description method used in the documentation was strange and it was therefore difficult for them to comment on things. **New gap**: task vs. actors, because the documentation was not read carefully enough by user representatives.

B3: Zulu joined the consortium in December 1997. From the viewpoint of the consortium, the decision of Zulu to join turned out to be significant for all the parties. Zulu did not have a preconception of whether the forthcoming system would meet their requirements. On the other hand, the Juliett Consortium could not gauge whether the joining of a new member would cause new demands on the system. The differing requirements of the newcomer only later became apparent to the representatives of the Juliett Consortium. **Prevailing gap**: task vs. actors, because the documentation was not read carefully enough by user representatives. **Emergingⁱⁱ gap**: task vs. structure arose because Zulu was not prepared adequately for the demands of the Juliett project.

B4: Implementation and testing phase (February 1998 – November 1999). The implementation phase was launched with optimism. It was intended that issues left open in specification and design would be complemented in the implementation phase. This was what the project group had agreed, but the implementation was carried out on the basis of deficient documentation. The customer waited for questions on issues needing clarification, while the supplier coded according to the documents making conclusions at its own discretion. At this time the consortium only had one project manager, whose tasks include the construction of cases for testing the system. But he did not have enough time to do this, and finally the cases were requested from the supplier. Not even the supplier could accomplish this with a sufficient coverage. Thus there were problems in testing. **Prevailing gap**: task vs. actors, because the documentation was not read carefully enough by user representatives. **New gap**: task vs. structure: not enough resources to make the test materials. **Emerging gap**: task vs. structure, because Zulu was not prepared enough for the demands of the Juliett project. **B5**: First Juliett software version delivered (August 1999). The vendor was alone without customer participation to implement the system on the basis of excessively abstract specifications. The customer was waiting for requests for clarification that were never made. As a result, the system had both technical problems and functional problems. **Resolved gap**: task vs. actors, because the documentation was not read carefully enough by user representatives; now the users see the system that is being tested. **New gap**: task vs. actors:

excessive amount of faults in software. **Emerging gap:** task vs. structure, because Zulu was not prepared enough for the demands of the Juliett project.

W2: Inauguration of the system at Zulu (Oct – Dec 1999). The software was poorly tested. Moreover, Zulu had not had enough time to get acquainted with the system they were introducing. The differences in the processes only became fully apparent at the inauguration. Major problems arose, and an effort was made to solve them with the so-called Zulu plan. Changes in the Zulu staff also made inauguration and above all data conversion difficult. **Partly resolved gap:** task vs. technology in the (old) work system: now the new Juliett was in use in Alpha and Zulu. **New gap:** task vs. structure, because Zulu was not prepared enough for the demands of the Juliett project. **New gap:** task vs. technology: the web-application was not functional because of software tool problems.

B6: Maintenance and corrections (February 2000 onwards). The system had to be brought to a reasonable condition as the first inaugurations had already been performed. Alpha coped with the problem by slightly increasing its resources, but the situation at Zulu was grave. The focus there was on correction of software faults and the improvement of functionality. The report programs were re-implemented under warranty, but other changes resulted in a lot of expenses. The Zulu situation was coming to under control via a special Zulu plan. **Prevailing gap:** task vs. actors: faults in software. **Prevailing gap:** task vs. structure: still too few developers and not enough money for rapid software development. **Resolved gap:** The web-tool is changed to a workable one. **B7:** Taking out a loan (Spring 2000). The trust of the leading officers at Alpha in the Juliett system could be seen concretely in the situation in which the managing director of Alpha granted a loan to the Juliett Consortium. Without this loan, the financial situation of the Juliett Consortium would not have allowed rapid improvement of the functionality of the system, and the situation of the system would have remained in a worse state for a much longer time. If the loan had not been granted/taken, the consequent slower improvement of functionality would also have tested the patience of the management of the other organisations. It is likely that there would also have been delays in the joining-in of new members, and the support given by the Ministry would not have been equally good. The new members also might have made a different decision in their own information system projects for study administration in that situation. In 2000-2002 the expenses clearly exceeded annual income. **Prevailing gap:** task vs. actors: faults in software. **Resolved gap:** task vs. structure: because of the loan, there was now enough money for software development for the short term, and resources could be increased. **New gap:** actors vs. structure: some Juliett steering group members (and their colleagues in respective organisations) did not approve the loan; they thought that work should be covered by the normal monetary frame. Other actors considered that future maintenance fees would cover the loan, and there should be no interruption in software development.

W3: Inauguration at Bravo (Spring 2001). The successful inauguration of the whole system at Bravo on April 2001 was psychologically significant especially for the Juliett project group, the management group and the consortium administration. The inauguration of the system only one week behind the schedule added to the general trust in the Juliett system. **Resolved gap:** task vs. technology in the (old) work system: now the new Juliett was in use in Alpha, Zulu and Bravo. Old systems could indeed be replaced by Juliett system. **Resolved gap:** task vs. structure: although Zulu was not originally prepared enough for what the Juliett project would demand, the progress there and the successful inauguration process at Bravo resolved this gap between task and structure. **Resolved gap:** task vs. technology: the non-functional web-application was replaced.

B8: Attempts at reorganisation (Spring 2003). Some of the organisations' IT managers thought that the work under the old Juliett organisation was exceptionally problematic. The discussions revealed radically different ideas about both system development and the organisational model needed for its coordination and the model of management. There were proposals that the consortium's operations should be incorporated into a company and a special institute should be founded. Most of the decision-makers thought, however, that it was most cost-efficient to arrange the operation of the Juliett consortium personnel as part of Alpha's activities through contractual arrangements. **Prevailing gap:** actors vs. structure caused by controversy about the loan. **Emerging gap:** actors vs. actors and some

actors vs. structure: Re-organisation. **B9**: Repayment of the loan (Summer 2003). Repayment of the loan to the Alpha showed that the financial situation had reached a balance and that there were no extraordinary financial burdens any longer. The belief and trust in terms of both the organisations' management and the Ministry had troubled many of the members of the management group. Now they could once again focus on the development of the system and how to organise cooperation. **Resolved gap**: actors vs. structure: controversy about the loan was over, because the loan was paid back. **New gap**: actors vs. structure: Re-organisation. **B10**: Reorganization, addition to personnel resources and further development (Autumn 2004). The first full-time project director was hired for the period from September 1, 2004 to July 31, 2007. The first author (the former Juliett directorⁱⁱⁱ) applied for the job, but was replaced by a new person. Two new project managers were hired starting January 1, 2005. The annual capacity of the consortium administration was 4.6 man-years, which was significantly higher than before. **Resolved gap**: actors vs. actors and some actors vs. structure: Re-organisation was now in effect. **Emerging, but still invisible gap**: actors vs. structure: the Juliett consortium changes introduced a new configuration that seemed unstable and led personnel turn-over.

General Case Interpretation: Figure 3 is a pictorial summary of the TANGO I project trajectory using the PSIC model. The project is seen as a punctuated equilibrium process, where critical incidents emerged at different levels, i.e. in both organisational and external contexts, affecting the stability of the building process. The building process is presented as a sequence of socio-technical entities (represented by diamond shapes) and gaps (shown as thicker arrows) that may appear between the four components following the occurrence of critical events. The organisational work process is depicted in a similar way. The mutual influences between these two parallel processes are also shown on the diagram, presented as thick black vertical arrows. These vertical arrows between the diamond shapes on the parallel processes demonstrate the significant points at which the two parallel processes intersected. Critical incidents generated gaps in the socio-technical components at the organisational work level process, which in turn resulted in gaps on the project level process.

The rows 'External context issues', 'Organisational context issues' and 'Build level issues' represent the critical incidents. The external context includes issues that are beyond the organisational boundary of the work and build areas. Organisational context takes account of planned or unplanned events that had significant impacts on the project implementation and also managerial decisions in relation to the implementation. Build management issues are issues that take place within or outside the project affecting the implementation process, such as a project team re-structuring. It is clear that the two parallel processes had significant influences over each other.

Our over-all interpretation of Juliett development history is that there existed four deep structures in the process from 1995 to 2005. The first deep structure was the optimistic development during the years 1995-1999. The punctuation generating this deep structure was the establishment of Juliett consortium and the TANGO I project. The second deep structure, the emergence of the development crisis, was punctuated or made visible through the delivery of the first versions of the software for testing in spring 1999. The third deep structure was the development crisis resolution, punctuated by the loan taking in spring 2000 and ending in several successful Juliett adoptions in 2003. After that, the elements of the work process were in balance and no gap could be seen between them. The last successful adoptions in 2005 were a further confirmation of the balance. The fourth deep structure was reorganisation, punctuated via the meetings for reorganisation in spring 2003 and ending in Juliett consortium's personnel changes in 2004 and 2005. The fifth deep structure would have been Juliett's development with new consortium personnel from 2005 onwards, but that era was beyond our research. Altogether, problems in TANGO I conditioned the change between TANGO II and III: the TANGO III organisation was made as simple as possible by reducing the number of actors to a minimum.

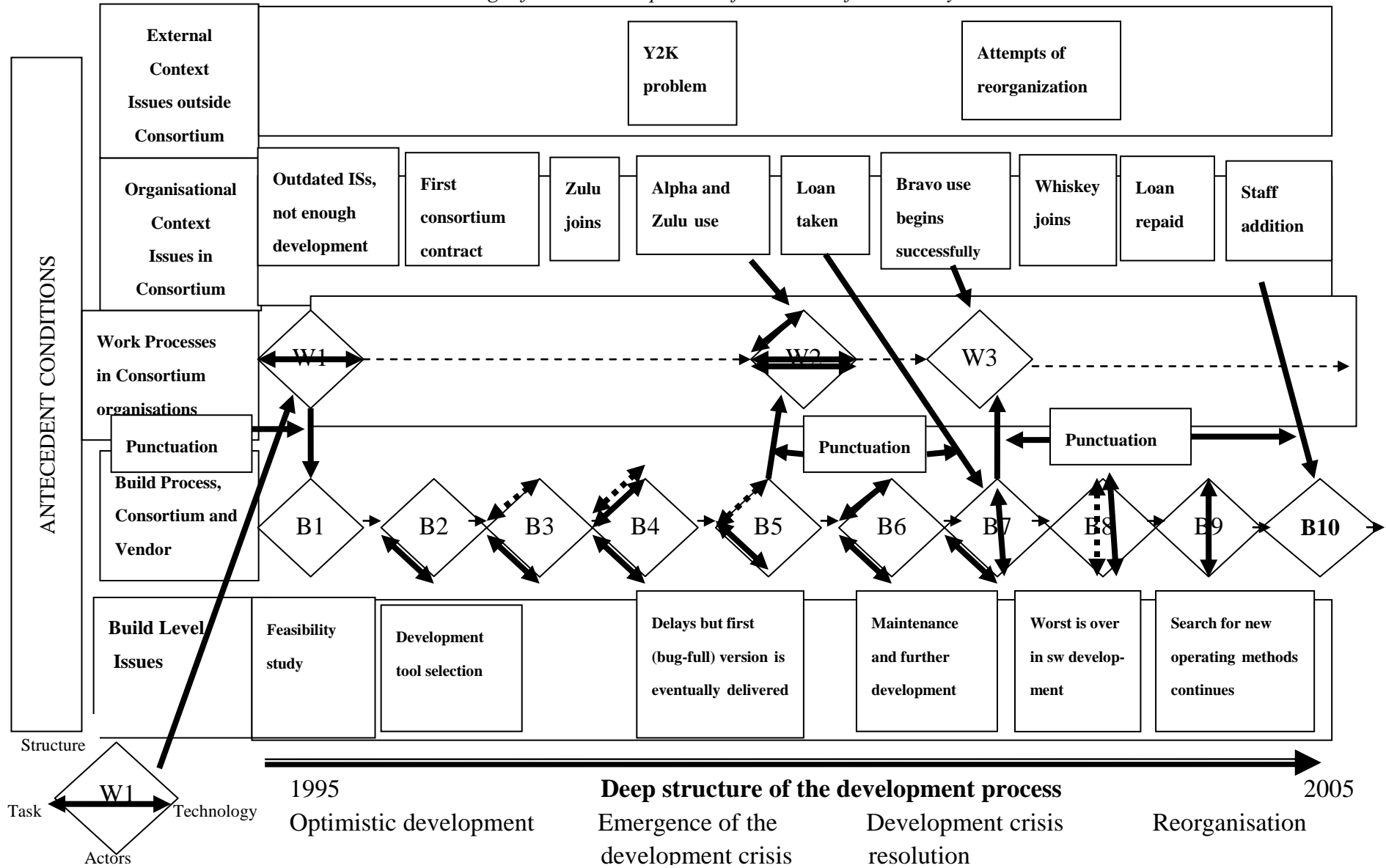


Figure 3. General Structure of the TANGO I Project Trajectory

6 Discussion: Lessons Learned

Returning to our research question: “*How can a combination of a socio-technical change model and PSIC model be used to illustrate the social dynamics of ISD in three collaborative public sector IS projects?*” we can now examine what the contributions of our study are for research and practice. By careful use of our documents and observations, we found that we were able to illustrate and explain a specific project effectively even though the organisational setting was a very complex one. We showed how the TANGO I project arose (the antecedent conditions) and how the major events shaped the process and led to the outcome with Juliett software and organising TANGO III.

Research contributions: *Firstly* we can comment on the proliferation of factor studies in IS research. Given the surfeit of factor studies, we need to balance these with further process studies such as the current one (Orlikowski, 1992; Robey and Newman, 1996). While factor studies are able to find out the relationships between independent and dependent factors, they essentially treat the process as unknown and indeed unknowable (e.g. Kanter and Walsh, 2004). They are normally studies without history and context (Carmel and Becker, 1995; Hargrave and Johnson, 2003; Tiwana and Keil, 2006). They frequently involve mail shots or web surveys where many subjects are sampled from one or many organisations. These studies elicit subjects’ opinions on dependent and independent factors or variables loosely based on hypotheses derived from the literature. In contrast, process studies, while targeting just one or a few cases, focus on the major events, their timing and sequence in order to describe and explain how history, process and outcomes are linked.

Secondly, we demonstrate the advantage of separating build and work processes. Often, the work (or legacy) system will provide the origin of the project, as in our case. For example, gaps in the old systems at Juliett between the task and the technology motivated the organisations to begin the project. Moreover, there will be times when intense interactions occur between the project team and the legacy system involving the users. The punctuated process model enables us to detail these processes and their interactions revealing the twists and turns of the project and showing how the outcome is linked to these. *Thirdly*, our process study is able to provide insights into the patterning effects of success and failure. By this we mean the historical patterns that develop and that are reinforced by repetition (c.f. Robey and Newman, 1996). That is why it is vital that the historical context of the project is revealed. At Juliett there was reported to be a relatively mixed history of systems development and legacy systems. In other situations the opposite can occur and an organisation can enter a cycle of failure and rejection by the user community which without any decisive action to break the pattern would most likely be repeated in any new project (e.g. Robey and Newman, 1996).

Fourthly, our study also provides insights in understanding the complexity of success and failure in ISD and concepts such as escalation and de-escalation (e.g. Keil and Robey, 1999; Drummond, 2005). By linking history, process and context we can trace the trajectory of a project and show how the process is uniquely related to the outcome and how the various stakeholders can variously capture the rhetoric of success. For example, in a previous case (Newman and Robey, 1992), the project was delivered five years late and four times over budget but was still believed by the managers to be a success. This and other examples indicate that escalation or the commitment of resources to a failing project and the demand to de-escalate such systems, appear to be simplistic from a process perspective. In the case of Juliett, the system was essential to the partner organisations and to abandon it prematurely would have created untold problems. The time overruns might be escalating but they still needed the system, i.e. there was no escalation or de-escalation in the demand for the system: they could not abandon it. The Juliett development crisis resolution showed that the Juliett community was after all committed to finalizing the system. *Fifthly*, we could give more of a “flesh and blood” type analysis of how the struggle between some IT managers and the (old) consortium personnel conditioned the flow of events of later stages, and how the problem of different world-views was eventually resolved, and what new tensions this resolution brought about. *Finally* for the research community, we acknowledge that case studies of this nature are highly labour intensive. However,

other researchers should consider following a similar research paradigm as there is a clear dearth of such studies. Such studies will derive rich data sets and theoretical understandings.

Practitioner Contributions: *Firstly*, the IS manager is, as in this case, often the boundary-spanner between management and the technical community and should be comfortable in both worlds. But ISD projects can throw up major sources of stress and Juliett was no exception. For example, the IS manager, i.e. the first author as the Juliett consortium personnel director, was involved in choosing the software tool but the case revealed there were continuing nagging problems resulting from this choice. The process perspective enables us to see how early decisions can cause an escalation of problems later which require many “band aids” or work arounds. This does not mean that the IS manager had alternatives in this case but it seems wise to invest time and resources in these crucial early decisions. While this is hardly surprising it does point to the importance of first moves in a project and the path dependent nature of ISD. This is an issue that could be addressed in greater depth in subsequent process studies. *Secondly*, project leaders also need a facility with users and developers. In the course of managing the project there will be effects within their control and other, external effects arising from context and beyond their control. So both reactive and proactive stances are desirable and this was noted in our case. Apart from issues arising from the project’s context, the process perspective also reveals the possibility of creating change through initiating critical events (Newman and Robey, 1992). *Finally*, from a senior manager’s perspective, the project’s budget and length is, unsurprisingly, often underestimated. In our case, the monetary issues could be resolved, because Alpha was willing to give temporary funding when it was urgently needed, and new members joined the Juliett consortium and brought finances in the form of joining and maintenance fees. The penalty with new members was that the coordination of the cooperation of the larger collection of user organisations became more difficult. This difficulty was avoided when TANGO III was organised: instead of two large consortia of TANGO II, there were four user organisations piloting the system that would later be adopted by all Romeo organisations, and Ministry funded the project via Alpha.

We can push the analysis further and recognise the importance of antecedent conditions. It is pointless beginning a large IS project if the organisation has a habit of IS failure. Negative patterns need to be broken. These poor patterns need to be acknowledged and managed. Like sports teams, companies have “form” (Newman et al., 2008). In sporting, this is with regards to winning games, but in our examples we are interested in achieving successful ISD. And like sports teams they often reproduce historical behaviour. In the case of Juliett, the history of ISD and use in different organisations was mixed. The over-all picture of the administrative IS projects in Alpha was rather positive: only one major failure was reported out of thirty projects, and even this failure turned out to be a success. But while success is difficult to maintain we know it is all-too-easy to throw away with one or two major failures until an organisation drifts into a pattern of failure (Lyytinen and Robey, 1999).

7 Conclusion

This research followed Lyytinen and Newman’s (2008), Newman and Zhao’s (2008) and Pan et al. (2006)’s approach that has shown that through the use of a case study in the Juliett consortium, critical events that occurred along the project process can affect the stability (i.e. equilibrium) of the project process. The process itself in the case of Juliett was identified as a sequence of events where the connections between a preceding event and its consequences were depicted. Each of these events was analysed by the interplay among its four components, i.e. actors, structure, technology, and task, and gaps were identified among the components in the case of critical incidents. The interactions between the organisational work process and build process were also analysed. While it does not solve the success/failure conundrum, our analysis offers a deeper understanding and enables us to comment on theories such as escalation and de-escalation (Keil and Robey, 1999) and the many factor or cross-sectional studies reported in the literature. Our analysis also links TANGO I, II and III projects as a continuum. However, in our case both TANGO I and TANGO III were eventually successful, although the process contained deep crises and considerable changes in project personnel.

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ⁱ We use fictitious pseudonyms for organisations and projects for confidentiality reasons.

ⁱⁱ We denote emerging gaps with dotted arrows.

ⁱⁱⁱ In 2001 the first author moved to work in Echo, continuing until summer 2004 as a part time director of Juliett via a contract between Alpha and Echo.