

Understanding Stories of Information Systems Failures

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Abstract

Information systems development failures are prevalent in many domains and countries. The aim of this paper is to explore some of the issues related to the study of such phenomena. Failure situations are not set-up in advance as the subject of studies. Analysing causes and relationship retrospectively depends on the ability to obtain rich and subjective contextual information that can be shed a light on the circumstances that precipitate failures. The paper makes the case for the use of case history and ante-narrative methods for understanding such scenarios.

Key words: Information systems development failures, case studies, case histories, narrative, ante-narrative.

1 Introduction

Action researchers focus on the results of action, which they view as decisions and learning. Learning is a process of detecting and correcting error, where error is defined as any feature of knowledge or knowing, that makes action ineffective (Argyris 1976). Dealing with errors results in learning, as action implies a problem with previous perceptions. Errors are thus crucial to theories of action and the understanding of learning is fundamentally associated with detection, diagnosis and correction of errors. Kolb (1986) rationalised that learning often starts with the experience of an event or stimulus which the individual reflects upon in trying to make sense of it. Reflection enables practitioners to deal with troublesome divergent situations of practice that do not conform to normal expectations and procedures. Learning takes place when a mistake or mismatch is acknowledged, its producers are identified, and it is corrected (Argyris 1976, Ackoff 1995). The field of information systems development appears to have produced its share of errors thus offering a ripe opportunity for learning. Such learning can often be difficult to foster and facilitate and the paper focuses on some of the implications on research practice in the domain of development failure.

Researchers with a keen interest in information systems' failures are faced with a double challenge. Not only is it difficult to obtain intimate information about the circumstances surrounding such failures, but there is also a dearth of information about the type of methods and approaches that can be utilised in this context to support such information collection and dissemination. The purpose of this paper is to highlight some of the available approaches and to clarify and enhance the methodological underpinning that is available to researchers interested in investigating and documenting failure phenomena in context-rich and dynamic environments. The focus of the discussion is on approaches to information systems failures that value the situational meanings and knowledge of participants and on a naturalistic research perspective, while at the same time advocating a mixture of quantitative and qualitative evidence and analysis.

The paper begins by introducing forensic software engineering and the need to understand failures through the consolidation of a diverse range of subjective accounts offered by

participants. Knowledge relating to failure is fragmented, distributed and hidden within the context requiring a naturalistic enquiry process. Moreover, untangling causes is inherently pervasive due to emergent properties and the inability to delineate causes and effects. The solution in the form of case-based methods provides an approach that can capture subjective knowledge and situational meaning, but requires a new perspective offered through detailed and chronological case histories of failures. The paper concludes by proposing the supplementing of case histories with ante-narrative inquiry which extracts fragments of stories that emphasise the multiplicity of views and perceptions and their critical interactions during the lead-up to disaster. This supports the capturing of shared knowledge pertaining to failures, thereby enabling a better understanding of conflicts and issues as highlighted by stakeholders.

2 Setting the scene

The popular computing literature is awash with stories of IS development failures and their adverse impacts on individuals, organisations and societal infrastructure. Indeed, contemporary software development practice is regularly characterised by runaway projects, late delivery, exceeded budgets, reduced functionality and questionable quality that often translate into cancellations, reduced scope and significant re-work cycles (Dalcher 1994). Failures in particular, tell a potentially grim tale. In 1995, 31.1% of US software projects were cancelled, while 52.7% were completed late, over budget (cost 189% of their original budget), and lacked essential functionality. Only 16.2% of projects were completed on time and within budget; only 9% in larger companies, where completed projects had an average of 42% of desired functionality (Standish 1995). The 1996 cancellation figure rose to 40% (Standish 1997).

The cost of failed US projects in 1995 was \$81 billion, in addition cost overruns added an additional \$59 billion (\$250 billion was spent on 175,000 US software projects, however \$140 billion out of this was spent on cancelled or over budget activities) (Standish 1995). In fact, Jones (1994) contended that the average US cancelled project was a year late having consumed 200 percent of its expected budget at the point of cancellation. In 1996, failed projects alone totalled an estimated \$100 billion (Luqi 1997). In 1998, 28% of projects were still failing at a cost of \$75 billion (Standish 1998), while in 2000, 65,000 of US projects were reported to be failing (Standish 2000).

The Standish Group makes a distinction between failed projects and challenged projects which has been widely adopted by researchers. Failed projects are cancelled before completion, never implemented or scrapped following installation. Challenged projects are completed and approved projects which are over-budget, late and encompass fewer features and functions than initially specified. Lyytinen and Hirshheim (1987) identify: correspondence failures (where the system fails to correspond to what was required), Process failures (failure to produce a system or failure to produce it within reasonable budgetary and time-scale constraints), Interaction failures (where the system cannot be used, or is not satisfactory in terms of the interaction) and Expectation failures (where the system is unable to meet a specific stakeholder group's expectations). Many situations contain behavioural, social, organisational, or even societal factors that are ignored and therefore the definition of failure needs to encompass a wider perspective. The general label 'system failures' is often utilised in order to embrace a wider grouping of failures, including ones with undesirable side effects which may impact other domains and the organisational context (see for example (Fortune & Peters 1995)). As information becomes more embedded in other domains, the

scope and impact of failure becomes more wide-reaching. This was clearly evident from the extensive effort to minimise the impact of the 'year 2000 bug' from any system containing computers and underscores our interest in using the term IS failure to a wider class of systems failures that merit investigating.

IS failure investigations start with extensive attempts to collate relevant evidence. Failure information tends to arrive from different sources typically including: anecdotal evidence and journalistic descriptions, reports of investigative committees, official public inquiries, audit reports, public account committee minutes and findings, case studies and empirical surveys. In specific cases this may be augmented by internal documents, interviews, eyewitness accounts, direct observation and archival records (and possibly physical artefacts). In most cases the researcher is exposed to specific information post-hoc, i.e. once the failure is well established and well publicised and the participants have had a chance to rationalise their version of the story. Most of the available sources are therefore already in place and will have been set up by agencies other than the researcher.

The purpose of a forensic investigation is to explain a given failure by using available information and evidence. The term Forensic is derived from the Latin 'Forensis', which is to do with making public. Forensic Science is the applied use of a body of knowledge or practice in determining the cause of death. Nowadays extended to include any skilled investigation into how a crime was perpetrated. Forensic systems engineering is the post-mortem analysis and study of project disasters (Dalcher 1994). The work involves a detailed investigation of a project, its environment, decisions taken, politics, human errors and the relationship between subsystems. The work draws upon a multidisciplinary body of knowledge and assesses the project from several directions and viewpoints. The concept of systems is a central tool for understanding the delicate relationships and their implications in the overall project environment.

The aim of forensic analysis is to improve the understanding of failures, their background and how they come about (Dalcher 1997). The long-term objectives are improving the state-of-the-practice and generating new insights into methods of managing complex projects. The knowledge generated is then fed-back into the process via a double loop learning system in order to improve the internal (organisational) or external (disciplinary) body of knowledge. Forensic systems engineering is thus primarily concerned with documentary analysis and (post-event) interviews in an effort to ascertain responsibility lines, causal links and background information.

The primary mode of dissemination of findings, conclusions and lessons is through the publication of case study reports focusing on specific failures. However, there are limited research methods to explore the dynamic and fragmented nature of complex failure situations. The armoury of research methods in this domain is often limited to main dissemination mode; case studies. Lyytinen and Hirschheim (1987) noted that more qualitative research methods were needed for IS failure research as well as more extensive case studies that explored problems in more detail and viewed solution arrangements in light of what transpired. The same methods also need to account for group issues and cultural implications. Sadly, 15 years on, the same constraints in terms of methods are still in evidence.

3 Background: Beyond the objective

The choice of a research method is strongly coupled to the type of information that is available to the researcher. The choice of method determines what type of information will be sought for subsequent analysis. Furthermore, the type of information that is available will determine the types of analysis that may be conducted. However the entire process must start with the research objective and how it is framed in terms of required.

The positivist stance, prevalent in the natural sciences, is centred on the notion that all knowledge, in the form of facts, is derived from either observation or experience of real, objective and measurable natural phenomena thereby supporting the notion of quantitative analysis. Facts can thus be viewed as universal truths devoid of personal values and social interactions and independent of time and context. This enables researchers to focus on regularity, repeatability and the verification and validation of causal relationships. The currency of such objective knowledge is the manipulation and metrification of objects and their relationships expressed in the form of numbers, to enable quantitative operations. This stance is difficult to sustain in failure research where the actions, perceptions and rationales of actors are not amenable to quantitative methods. (Note however that the actual findings and the factors leading to accidents can subsequently be modelled using quantitative notations.)

At the other extreme, (interpretivist, constructivist or relativist) knowledge can be viewed as encompassing beliefs, principles, personal values, preferences, social context and historical background which are inevitably dynamic as they change with time (and context). Qualitative research methods originate in the social sciences where researchers are concerned with social and cultural phenomena. Social interaction in human activity systems ensures intersubjectivity as actors are forced to negotiate and agree on certain aspects. The humanistic perspective is outside the conventional positivist norm. The resulting emphasis is on the relevant interpretation of knowledge as held by participants in a social activity. Data sources utilised by researchers include observation, fieldwork, interviews, questionnaires, documents, texts, and the impressions and reactions of the researchers. Such qualitative perspective relies on **words** (Miles & Huberman 1994), conveying feelings and perceptions, rather than numbers. Qualitative methods recognise the fact that subjects can express themselves and their feelings and thereby, clarify the social and cultural contexts within which they operate. Meaning therefore needs to be ‘interpreted’ in a process of ‘sense making’. Actions thus need to be understood in terms of intentions, which in turn are understood in their original context (Schutz 1973). Indeed, Kaplan and Maxwell (1994) argue that the goal of understanding a phenomenon from the point of view of the main participants and their particular social, cultural and institutional context is largely lost when the textual data are quantified.

Making sense of IS failures retrospectively is difficult. In general, there is very little objective quantitative failure information that can be relied upon. This makes the utilisation of quantitative methods less likely, until all relevant information is understood. Indeed, a specific feature of failure is the unique interaction between the system, the participants, their perspectives, complexity and technology (Perrow 1984). Lyytinen and Hirschheim (1987) pointed out that failure is a multifaceted phenomenon of immense complexity with multiple causes and perspectives. Research into failures often ignores the complex and important role of social arrangement embedded in the actual context. This is often due to the quantitative nature of such research. More recently, Checkland and Howell (1998) argued that the IS field requires sensemaking to enable a richer concept of information systems. Understanding the interactions that lead to failures likewise requires a humanistic stance that is outside the

conventional positivist norm to capture the real diversity, contention and complexity embedded in real life. Forensic analysis thus relies on utilising qualitative approaches to obtain a richer understanding of failure phenomena in terms of action and interaction (as explored in subsequent sections).

(Note that triangulation, the mixing of quantitative and qualitative methods, offers the opportunity to combine research methods in a complementary manner in one study. A good example of such a mix in failure research would entail reliance on qualitative methods to capture the essence, context and webs of interactions in the build-up to failure and complement the presentation by using more formal approaches to model the impact of such interactions.)

4 Issues, controversies, problems: Knowledge is Hidden within the Context

Qualitative research methods are concerned with generating richer knowledge. However, knowledge is not something that exists and grows in the abstract (Boulding 1956); It is a property of the interaction between agents and the environment and is tied to perspectives, intentions and perceptions. Meaning is therefore not an intrinsic property of a message but depends on the code or set of alternatives from which the message comes (Ashby 1960, Campbell 1982, Lissack 1999). In fact, Nadler (1985) noted that ‘information is not a brick that can be thrown from one person to another with the exact same meaning’.

Knowledge is deeply bound to its original context, which enables a ‘contextually correct’ understanding. It is also strongly coupled to the time frame, and thereby, to the prevailing mindset. Only through the effective capturing of the precise context, can information be evaluated against the rationale, motives and assumptions that applied. Information about failure, much like evidence given by witnesses can only be understood through the identification of position, perspective and relationship. Any useful information must therefore be accompanied by additional contextual information that will shed light on its utility, validity and relevance and any methods adopted need to support the identification of such contextual knowledge.

The fact that a failure phenomenon is being investigated, suggests that attention has already been drawn to the complexities, breakdowns and messy interactions that such a situation entails (i.e. the investigation is problem-driven). Many such inquiries deal with subjective accounts including impressions, perceptions and memories. The aim of the researcher is to increase in a systemic way the understanding of a situation, yet do so from a position that takes in the complexity of the entire situation and incorporates the different perspectives and perceptions of the stakeholders involved. Phenomenology can thus be described as the study of direct experience taken at face value and may utilise verbal, diagrammatic or descriptive model forms (Remenyi et al. 1998). The focus is on what the subject experiences and its expression in a language and mannerism that is loyal to that experience.

Methods used to research failures need to be systemic and be able to get beneath how people describe experiences to the underlying structure and webs of interactions. Such methods need to:

- offer a holistic view unravelling a systems perspective on the entire topic of study thus enabling researchers to ascend beyond the details – in failure research this enables the investigator the glimpse the ‘total system’;
- be an inductive approach that enables the construction of meaning in terms of the situation and the development of general patterns that emerge from the cases under study;
- enable researchers to extend the boundaries of the system to capture interactions that may impact the failure; and,
- support naturalistic enquiry enabling phenomena to be understood in their naturally occurring settings

Overall, the purpose of a failure research method is to enable the researcher to make sense of the complexity of detail and the complexity of interaction and chart the contributory role of different causes and issues in the build up to failure. The next section continues to explore some of the unique characteristics of failure, in terms of identifying causes and circular relationships that make the understanding of such phenomena even more complicated. These issues will need to be addressed in terms of any methods that can be used to highlight the nature and characteristics of failure phenomena.

5 Emergence and Simplistic Causality

Interestingly, many failure investigations try to reduce failure explanations to simple causal pairings (Lyytinen and Hirschheim 1987) thereby ignoring the role of participants, their knowledge, assumptions and the overall environment. It is often noted that cause-event relationships do not tend to be ‘objective’ (Checkland and Holwell 1998, Lemon 2001, Stake, 1995) and that neither time sequencing nor correlation, are likely to provide a plausible proof of causality (Hage and Meeker 1988). Interpretivism calls the possibility of uncovering causal links into question because all entities are in a state of ‘mutual shaping’ so it is impossible to distinguish causes from effects (Thietart 2001). Moreover, each failure is unique. In many cases complex interactions between actors, systems and failure causes play a part in creating a dynamic (and messy) mix. Therefore it is more important to try to understand the meaning that actors give to reality, as intentions, motivations, expectations, beliefs, perceptions and fears are all grounded in the perception of reality. Failure research must proceed by taking into account the sum of all interactions and their dynamic co-linear relationships.

The general phenomenon of emergence defies causal analysis, forcing greater emphasis on interactions. All systems are composed of inter-parts and the system can only be explained as a whole. Accidents and failures display similar tendencies as unexpected and ‘interesting’ interactions and properties emerge. When interactions occur in a certain way and order, they give rise to emergent (and often unexpected) patterns of behaviour. The complexity and interconnectedness of interacting components and agents thus gives rise to emergent phenomena. Emergence resulting from such synergies, intra-acting interactions and non-linear dynamics is represented by new properties, capabilities and behaviours of the overall system. All too often emergent properties are neither designed nor planned. Slight changes in input or interaction patterns will thus lead to differences in emergence (i.e. unexpected new behaviours).

Proofs of causality are inevitably tenuous (Lowrance 1976). Moreover, due to emergence and unexpected interactions, forming a direct link between cause and effect is rather complicated and somewhat misleading (Perrow 1984). Cause-effect relationships involve uncertainties in both directions. In principle, separating cause from effect depends on the assumption of

stability and minimum change within the environment. In practice, one is often faced with events (or potential events). A more realistic approach is to focus on an event, and trace the range of causes and the effects that have resulted from them.



This approach enables the identification of multiple causes and multiple effects from the same event (as well as the detection of multiple events resulting from the same cause).

One of the major complications in failure investigations is in relating causes to effects (and possibly events) through extended time horizons (Dalcher 2000). The implications of actions may not be witnessed for years, or even generations. Delays between making a decision and observing the result distort the causal link between the two. As a result, people tend to associate a different level of severity to events occurring following a delay. The perceived severity is thus diminished with the length of the delay further complicating the task of identifying patterns and interactions that contributed to a given failure. Failure researchers are thus required to provide adequate historical accounts of the interaction between actions, perceptions and the passage of time.

6 Solutions: Using case studies to describe reality

Having looked at some of the complications associated with capturing actions, reactions and perspectives, it is now time to turn our attention to the main tool of forensic IT research, the case study. The term “case study” is an umbrella term used in different contexts to mean different things that include a wide range of evidence capture and analysis procedures. Yin (1994, p.13) defines the scope of a case study as follows:

“A case study is an empirical inquiry that:

- investigates a contemporary phenomenon within its real-life context, especially when
- the boundaries between phenomenon and context are not clearly identified”

A case study can be viewed as a way of establishing valid and reliable evidence for the research process as well as presenting findings which result from research (Remenyi, 1998). According to Schramm (1971) the case study tries to illuminate a decision or a set of decisions and in particular emphasise why they were taken, how they were implemented and with what results. A case study is likely to contain a detailed and in-depth analysis of a phenomenon of interest in context; in our case, the failure scenario.

The general aim of the case study approach is to understand phenomena in terms of issues in the original problem context. A Case study allows the researcher to concentrate on specific instances in their natural setting and thereby attempt to identify the interacting perceptions, issues and processes at work, ultimately resulting in in-depth understanding. Some of these interactions are likely to prove crucial to the success or failure of the organisation/system under scrutiny. Focusing on relationships and processes facilitates a holistic perspective revealing underlying patterns, and possibly some emergent properties. Many of these patterns remain hidden under normal conditions, but can be prised open as a result of the special focus. (Note that case studies may contain rigour and application of careful logic about comparisons in the positivist tradition.)

In the context of failures, exploring a particular case or set of events entails attempting to provide the richest perspective of what transpired through the analysis of multiple subjective accounts of participants, the explanation of phenomena and the retrospective identification of relationships. Case studies provide the mechanism for conducting an in-depth exploration. They often result from the decision to focus an enquiry around an instance or an incident (Adelman et al. 1977), as they are principally concerned with the interaction of factors and events (Bell 1999). Indeed, sometimes it is only the practical instances that enable one to obtain a true picture of the interaction (ibid.). The combination of a variety of sources offers a richer perspective which also benefits from the availability of a variety and multiplicity of methods that can be used to obtain new insights about this single instance. Crucially, the focus on a single incident thus enables the study of the particularity and complexity of a case, thereby coming to understand the activity within important circumstances (Stake 1999).

Case studies are more likely to be used retrospectively rather than as an on-going perspective (especially from a failure point-of-view), as researchers are unlikely to know the potential for useful results and interest from the outset. Case studies are useful in providing a multi-dimensional picture of a situation (Remenyi 1998) in the context of historical description and analysis. The richness of detail can be controlled through the careful placement of systems boundaries and consideration of the wider system environment that is relevant to the phenomenon under study. Case studies can be utilised as source of understanding, which is tolerant of ambiguity, paradox and contradiction. A case study is viewed as interpretative when events in the real world are observed and then an effort takes place to make sense of what was observed, i.e. when one tries to make sense of a failure from the perspectives of participants. They also offer the potential for generating alternative explanations from the different stakeholder perspectives thereby allowing the researcher to highlight contradictions and misunderstandings.

Case studies can be viewed as a comprehensive research strategy, rather than as an information collection tool or a research design method. Information collection methods for case studies often use observation, document reading and interviews, but other methods can be selected to suit the particular requirements of a case and the general strategy. Case study work needs to be self-contained, but researchers have the luxury of being able to expand the boundaries to incorporate emerging patterns and perceptions. The data, and indeed the analysis, are grounded in reality.

The main advantages of using case studies include:

- ✓ ability to identify and focus on issues
- ✓ richness of detail
- ✓ multiple perspectives
- ✓ multiple explanations (no absolute truth)
- ✓ cross disciplinary remit
- ✓ ability to recognise and minimise inherent complexity
- ✓ ability to handle conflict, disparity and disagreement
- ✓ ability to show interactions
- ✓ ability to observe emerging patterns
- ✓ conducted in real-life setting
- ✓ encompasses original problem context
- ✓ ability to deal with interpretations
- ✓ can extend the boundaries to include aspects of wider system environment

- ✓ can be accumulated to form an archive of cases

The main objections to their use include:

- ❖ sometimes viewed as soft data (but some argue it is hard research)
- ❖ biases inherent in accepting views and perceptions
- ❖ questions about generalisability of findings (especially from a single case), but it is possible to build a library of such cases
- ❖ issues regarding objectivity of approach and perceived lack of rigour
- ❖ negotiating access to settings
- ❖ boundaries are difficult to define; but this could also be a strength!
- ❖ mainly retrospective
- ❖ sometimes viewed as likely to take too long and result in massive documentation
- ❖ the observer effect
- ❖ reliability of conclusions
- ❖ there is little control over events, but this may also be a strength

In summary, case studies are ideal for exploring interactions between people and their understanding of a situation. The richness of the data obtained by multiple means from multiple perspectives provides a real insight into the main issues at play. The time dimension (sequencing) is critical to understanding interactions and identifying their impacts. Actions (and reactions) can only be understood in context, and case studies create the context for understanding them. Emergence often defies causal analysis forcing a greater emphasis on interactions; however, case studies enable the identification of networks of issues that people are likely to act on. The generally liberal use of the term case study requires a tighter definition of its meaning in failure research. The next section sets the role of case studies within the context of IS failure research.

7 Recommendations: Case histories to replace case studies

While there may be a tradition of using case studies within the IS community, this is perhaps more often borrowed from the MBA culture than as a result of self conscious effort to adopt them as a research approach (Walsham 1995, Cornford 1996). Indeed, the case study is typically used more in its capacity as a teaching tool than as a **research tool**. The shift to studying the impact of issues within the organisational context renders case studies particularly useful for investigating failure scenarios. However, the use of the term often leads to some confusion. Case studies have been used to adopt an idiographic (Cornford 1996), an interpretivist (Walsham 1993, Stake 1999), a constructive (Jankowitz, 2000) or even a positivist (Yin 1984, Yin 1993, Yin 1994, Benbasat et al. 1987) stance.

After Walsham (1993) and Myers (1994), we take the view that interpretivist case studies develop deeper understanding of IS phenomena. The shift from technical to organisational issues (Benbasat et al. 1987) necessitates a deeper look at how people act on interpretations and perceptions. Generating explanatory models enables expressions of patterns, judgements and values that provide a systemic clue to the unfolding of events.

Case studies are typically used to explore issues in the present and the past and comprise of ethnographic studies, single case studies and comparative case studies (Jankowicz 2000), as well as, action research, evaluative, exploratory, explanatory and descriptive case studies (Basse 1999). In our experience there is a need to add the failure case study as a special

example of a case study focusing primarily on the background, context, perception, interactions and patterns, especially as the failure investigation is likely to take place after the (failure) event. We thus propose the use of the label **case histories** to refer to the specialised historical research studies focusing on failure incidents.

Case histories are concerned with providing the background and context that are required to endow words and events with additional meaning. Background refers to previous history of the system itself, while context refers to interactions with the environment. As failures are time- and place-dependent, the case history framework enables readers to obtain an understanding of the intimate context surrounding the main event. The primary tool available to the community is the Case Histories of failures (derived from the use of the case study method). These represent a detailed historical description and analysis of actual processes. Their value is in tracing decisions (and recorded rationale) to their eventual outcomes by utilising techniques borrowed from decision analysis and systems engineering. Indeed, the historical description and presentation of a chronology of events are based on the recognition that real life is ambiguous, conflicting and complex.

Case histories highlight complexities and trade-offs that are embedded in the acquisition and development processes or in the operation and interaction mode. They also help in the identification, definition and assessment of pervasive problems in a given application domain. Maintaining repositories of forensic case histories is a form of risk management and hopefully, mitigation that can be applied to future undertakings (Dalcher 2002). Failures are crucial to the development of a mature and responsible discipline that responds to crucial issues that emerge from past failures. Case histories thus aid in understanding the role and significance of failures.

Recommendations: Case histories contain observations, feelings and descriptions. They can be used to construct, share, dispute and confirm meanings, interpretations and scenarios in the context of real events. Such observations must be systematically processed and structured. Their validity depends on the procedures used to obtain the information. Where possible, multiple sources of evidence should be used to support the emerging story. A mix of methods for obtaining the information will also enhance the value of the result. The use of alternative perspectives enables the analyst to consider conflicts and varying perceptions and their role in the unfolding story. Finally, case histories should be composed in an engaging manner to provide convincing reading (Remenyi et al. 1998) with a clear and concise story.

It is now clear that case histories provide more than a straightforward chronology of events. Rather than simply highlight a chronicled sequence of happenings, they convey a story encompassing a specific perspective, focus, and possibly some inevitable biases. The interpretation plays a key part in transmutating the chronicle into a meaningful story with plot, coherence and purpose. However, constructing a convincing narrative of a complex story with competing meanings, alternative perspectives and inherent prejudices is a challenge in itself.

8 Future trends: Stories are narrative inquiry

As we have seen, failures in common with other organisational activities are based on stories. The verbal medium is crucial to understanding behaviour within organisations and systems, and researchers are thus required to collect stories, grounded in practice, about what takes place (Gabriel 2000, Easterby-Smith 2002). The result is the transformative plotting of

scattered events to uncover hidden patterns and unexplored meanings (Denning 2001, Kearney 2002). Similarly, understanding failures often entails the retrospective untangling of complicated webs of actions and events and emergent interaction patterns. Failure storytelling can thus be understood as a combination of narrative recounting of empirical events with the purposeful unlocking of meaningful patterns or a plot.

Historically, story telling has been an acceptable form of conveying ideas, experience and knowledge of context. It plays a key role in communicating the cultural, moral or historical context to the listener. Indeed, Arendt, (1958) argued that the chief characteristic of human life is that it is always full of events, which ultimately can be told as a story. There are even strong claims that the narrative is the main mode of human knowledge (Bruner 1986; 1990, Schank 1990), as well as the main mode of communication (Fisher 1984; 1987, Schank 1990, Boje 1991, Denning 2001). Moreover, children are often initiated into culture (and its boundaries) through the medium of story telling, offering models for emulation or avoidance.

In practice, the essence of any good case study revolves around the ability to generate an effective storyline, normally with a unique style, plot or perspective. In a large case, a general theme can be obtained from selected excerpts weaved together to illustrate a particular story. Personal stories that form part of a case study can thus be viewed as a valid source of data organised to make sense of a theme or problem. This is particularly useful when the researcher is trying to portray a personal account of a participant, a stakeholder or an observer in an incident, accident or failure. The implication is that the need to address personal aspects of interaction and story (that remains a problem in IS research) is fulfilled by the development of a research-valid narrative. Indeed, Remenyi et al. (1998) contend that a story, or a narrative description, is valid if the resulting narrative adds some knowledge. Furthermore, White (1973) describes a story as 'the process of selection and arrangement of data from the unprocessed historical record in the interest of rendering the record more comprehensible to an audience of a particular kind' by inserting a sense of perspective and purpose.

A narrative can be structured to give a voice to the researcher, to the narrator, to the participants, to the stakeholders or to cultural groups, traditions or ideas. In the context of research it is not concerned with the development of a reflective autobiography or life story but rather with the analysis and devolvement of themes that emerge from a medley of events (Bell 1999, Carr 2001, Polkinghorne 1987, White 1973). Researchers are thus concerned with how information interpreted from a story can be structured in such a way as to produce valid research finding. This form of narration can be particularly useful in uncovering motives and rationales and linking them to the actual consequences and their impact on stakeholder groups. It also suggests an understanding of implied causes and emergent interactions.

Understanding IS failures is therefore more complicated than the discovery of a simplistic chronology of events. Failure researchers collect subjective accounts extracted from participants and observers. Developing narratives relies on trust between the researcher and the storyteller. Storytellers reveal personal feelings and motivations which may compromise their position or interests. Sharing the information, and making it public suggests that the storyteller is prepared to release certain details about themselves and their position publicly. This may have ethical research implications (as well as the potential for organisational, or even legal complications). Shared stories imply shared concepts, shared vocabularies and shared perceptions (or as a minimum, the ability to see where the sharing stops).

Narratives are neither discovered, nor found: they are constructed. Narrative inquiry is evolving into an acceptable research approach in its own right in the social sciences and in management research circles (Czarniawska 1998, Bell 1999, Gabriel 2000, Easterby-Smith 2002, Boje 2001). The story format provides a powerful way of knowing and linking disparate accounts and perspectives. The main pitfall with this approach revolves around the narrative structure which is developed by the storyteller. If the initial storyteller is not the researcher, care should be taken to eliminate personal biases in terms of outcomes and actions (but these should remain as descriptions of feelings, reactions and motivation). Follow-up questions can thus provide the mechanism for clarifying context, background, rationale or sequence, or more generally for 'objectifying' and 'time-sequencing' the events. When different accounts are combined, the story line benefits from the richness of multifaceted insights.

Developing a narrative requires plot as well as coherence as a story is made out of events and the plot mediates between the events and the story (Boje 2001, Carr 2001, Kearney 2002). In failure stories, the plot often emanates from the actions and perceptions of participants emerging out of the flux of events, in (direct) contradiction with expectations. The storyteller is concerned with the perspective and purpose of participants as well as with the plausibility of the emerging plot. The combination of plot, purpose and perspective dictates the selection of elements, the filling in of links and the removal of 'irrelevant' noise.

Post-modern interpretation contends that most real life stories are fragmented, non-linear, multivariate and incoherent. This has already been highlighted as a feature of failure stories. Such stories also tend to be dynamic, polyphonic (multi-voiced) and collectively produced as they occur in asymmetrical, random and turbulent environments. The stories are not plotted as such and they appear to flow, emerge and network offering complex clustering of events, emergent phenomena, causes and effects. Moreover, the accounts are often subjective, counter-intuitive and contradictory. This leads to interacting, and conflicting webs of narratives, characterised by coincidences, predicaments and crises.

Generally, stories appear to be improperly told, as a story is an 'ante' state of affairs existing previously to a carefully constructed narrative (Boje 2001). The **antenarrative**, or the 'real' story, is the fragmented, messy and dynamic, multi-vocal, multi-plotted, multi-version and complex tale. Indeed, modern story-tellers look for new ways and mediums for weaving and depicting a multi-vocal reality, as exemplified by Mike Finggis's digitally shot film *Time's Arrow*, where the screen is split in four to allow for four separate perspectives and sub-stories that occasionally intersect or overlap. In the tradition of post-modern inquiry, a real life researcher is often faced with fragments rather than a whole story to tell; and many of the fragments may reflect contrary versions of reality. This is potentially more acute when the accounts attempt to justify roles of participants in the lead-up to disaster. It would also appear from past analysis that there are hierarchies of stories and stories that exist within, or interact with other stories. Using the terminology provided by Boje, the purpose of narrative methods is to take a complex situation characterised by collective (yet often conflicting) memory and an antenarrative and construct the plot and coherence that can be used to narrate the story of interest.

The reality in failure stories is of multi-stranded stories of experiences and reactions that lack collective consensus. Indeed the discipline of decision making has also recognised that making choices is about forming and selecting interpretations from a mosaic of possibilities (March 1994, Weick 1995, March 1997). Not surprisingly, disasters or traumatic stories are

hard to narrate, understand and justify. Stories have three basic properties: time, place and mind (Boje 2001) which interact and build up as the story evolves. In forensic case histories, these are further clarified through the identification of the background and context which clarify and justify the interpretation in the context of the emerging phenomena.

Boje (1991; 2001) and Kearney (2002) contend that the current view is of sequential single voice stories and implies excessive reliance on the hypothetical-deductive approach (akin to simplistic causal pairings). The answer is not to develop Harvard case studies but to rewrite stories as polyvocal tapestries enabling different perceptions and interpretations to exist, thereby explaining webs of actions and interactions. What is new in this approach is the antenarrative reading which enables narrative analysis methods to be supplemented by antenarrative methods, allowing previously fragmented and personal storytelling to be interpreted as a unified whole. This focus offers alternative discourse analysis strategies that can be applied where qualitative story analyses can help to assess subjective, yet 'insightful' knowledge in order to obtain 'true' understanding of complex interactions.

9 Conclusion

With the benefit of hindsight it is possible to re-construct a systematic re-telling of events that have led to a failure. The narrated structure provides an explanation as to how and why failures occur. The purpose of the structure is to make sense of a rich tapestry of interactions and connections by following an identified storyline that chronicles and links the relevant issues within the environment. This can lead to a rich explanation or justification grounded in the original perception of the problem environment. Indeed, recounted life may prise open perspectives that would have been inaccessible using ordinary methods and thinking arrangements. Moreover, failure tends to highlight missing and incorrect assumptions and faulty defensive mechanisms and can therefore serve as a pretext to updating the frame of reference or the context for understanding.

This paper focused on the qualitative research methods available in the domain of IS failure. Failures are often dynamic and confusing, requiring a holistic approach to resolution. Investigating and making sense of IS failures is still a relatively immature discipline with little awareness of alternative approaches for identifying and capturing that knowledge.

Case studies have been used as the traditional means of transmitting knowledge about past failures. However, this is often done with little consideration for the terminology, implications and multiple meanings associated with case studies and therefore calls for additional refinement and for the discovery of richer and more diversified alternative approaches. Case histories are a special instance of a case study looking at the factors involved in failures in context, and at the dynamic interrelationships between them. They can be described as a problem-driven research tool focusing on the 'holistic totality' in a naturalistic setting. Narrative methods (and antenarrative reading) provide an additional facet for addressing the fragmented nature of failure stories. Their great strength is in offering an alternative to sequential, single-voiced stories; thereby giving a voice to a multiplicity of perspectives. Narrative methods thus offer a new meta-tool for the armoury of the IS failure community.

Combining case histories with narrative descriptions is likely to lead to clearer failure stories that can account for contradictions and misunderstandings. It is hoped that by developing our understanding of methods that help in capturing and structuring histories and in telling stories we will also improve our ability to learn from such experiences. Indeed, the methods

discussed in this paper form the front-end required for understanding and capturing knowledge in action (which could be supplemented by more formal methods to model their impact through a process of triangulation).

As for the future, good stories can also benefit from pictures. Once we have mastered the techniques of telling complex, modern stories, we need to focus on composing that information. Even the most gripping story needs to be made attractive and believable. Textual information needs additional support not only in 'emplotting' and in maintaining coherence and perspective, but also in ascertaining the plausibility of constructed stories and in differentiating between noise and narrative. Developing improved techniques for organising or visualising knowledge (such as Net maps) can therefore help in untangling some of the fragmented strands as well as in making the stories more readable and understandable, as well as ultimately more appealing. The process of so doing can then play a key part in engendering reflection in action and gaining a richer insight into the phenomena of failure leading to improved action.

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