

Learning from Information Systems failures by using narrative and ante-narrative methods

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We see, know and experience information systems development failures in many domains and in many countries. This paper will explore some of the issues related to the study of these failures. Every year, billions of dollars are wasted on failed projects in developed countries. Developing countries can learn from these grim experiences so as not to waste precious resources in repeating similar failures. The paper will emphasise the fact that the study of failures can only take place post-hoc, once a failure has been identified. Preparation is therefore different to normal scientific study where a situation is pre-selected in advance, the precise parameters are identified and decisions are made about the best methods for measuring them accurately and objectively. The literature reveals that researchers and practitioners have been experiencing projects failures for many years. Indeed, acknowledgements of failures go back at least thirty-five years. However, failures are still a prevalent problem. A significant obstacle related to the study of failures is the lack of acknowledged research methods for understanding such complex phenomena. The evidence collected during failure investigations emerges from a variety of sources, perspectives and contexts. Not surprisingly, it often appears to be ambiguous, incoherent and confused. The information collected tends to be rich, messy, contradictory and subjective. Such situations call for a new repertoire of methods to address the unique features of failures. This paper will introduce possible alternative ways of looking at and constructing failure stories. The techniques described below come under the umbrella term *forensic analysis*. The insights obtained from forensic analysis can be used for internal learning within organisations as well as externally within the discipline, thereby enabling practitioners and developing countries to benefit from the mistakes of others.

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General Terms: Management, Human Factors

Additional Key Words and Phrases: Information systems development failures, case studies, case histories, context, narrative methods, ante-narrative methods

1. INTRODUCTION

Billion of dollars are wasted each year on failed projects. The media is awash with reports of regular losses in the IT industry because software projects: are not delivered on time; are over budget; don't meet the expectations of users; or are of questionable quality. Most IT practitioners have experienced project failures at first hand and many researchers have studied the phenomena for a number of years to come up with different sets of reasons and factors purporting to influence the success or failure of projects. However, it seems that the ultimate solutions are yet to be found.

The first indications of the problem and mention of the term 'software crisis' were made during the NATO conferences in 1968 and 1969 [Naur and Randall 1968, Buxton et al 1969]. Indeed, conference attendees reported a set of symptoms that would strike a cord with developers and managers today. Twenty-four years ago a GAO report in the US [Anon 1979] showed that there were serious problems in the development of software. Less than 2% of the total value of contracts could be used efficiently as delivered. 3% could only be used after changes. The rest of the projects had the software delivered but never successfully used; the software paid for but not delivered; or the software used but extensively reworked or later abandoned. These problems are clearly not new, and the first edition of the best selling book in software engineering tells the story of a major IBM software project with major cost and schedule delays which teetered on the brink of disaster for a number of years from the perspective of the project manager trying to stabilize the project [Brooks 1975].

Researchers with an interest in the reasons for such failures are faced with more than one challenge. Information about each failure and the circumstances surrounding the failure are difficult to obtain, but there is also a general lack of knowledge about the ways, methods and approaches for doing so. Lyytinen and Hirschheim [1987] noted that more qualitative research methods were needed to investigate IS failures. The need for such methods is still evident from the current failure statistics. The aim of this paper is to look into the general area of project failures and discuss the

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problems that impact the understanding of failures. The paper will also highlight some of the available approaches for investigating the failure phenomena and propose alternative methods that may begin to address some of the original concerns by taking into account the many stakeholders' views and perspectives and the rich interplay of contextual information and conflicting accounts.

While the paper is likely to be of interest to IS practitioners and researchers the developed countries, it has a specific value to such communities in developing countries. Developing countries, where resources are more limited, can ill afford the luxury of making the same mistakes. If they can learn from the worldwide experience of past failures, their precious resources just may be utilized more efficiently.

2. FAILURES

2.1 The cost of failures

According to the Standish report [1995]: 31.1% of US software projects were cancelled in that year and 52.7% were completed over the allocated time, over budget (costing 189% of the original budget) and lacked certain functionality. The cancellation figure for the following year (1996) looked even worse – a cancellation rate of 40% [Standish 1997].

The cost of failed projects in the US in 1995 was \$81 billion and projects that overrun their budgets added another \$59 billion. Developers spent \$250 billion on 175 000 US software projects but \$140 billion of this (56%) was wasted on cancelled or over budget activities [Standish 1995]. The cost of failure in 1996 was \$100 billion [Standish 1997]. According to Jones [1994] the average US cancelled project was a year late and at the cancellation point consumed 200% of its allocated budget. By 1998, 28% of projects were still failing at a cost of \$75 billion [Standish 1998]. The number of projects that were failing in the year 2000 was 65 000 [Standish 2000].

Smaller cases make the computing press with alarming regularity. Goodwin [2003] reported in the *Computer Weekly* about an IT project fiasco between the Co-operative Group and ICL where £11 million are claimed in losses as a result of project failure. A common IT infrastructure was to be installed across the whole Co-operative group – the largest UK retail company. ICL failed to deliver the requested goods in time. A legal battle is still ongoing. Costs cannot only be counted in monetary terms. The failure of an ambulance despatch system may lead to loss of life. Another recent disaster in the UK, related to an earlier failure. The delay in introducing the Nirs2 system into the Inland Revenue beginning in 1995, meant that additional backlogs were building up. The backlogs caused the Inland Revenue to stop sending reminders to up to a third of the UK working force warning them that they needed to top up their national insurance contributions. As a result around 10 million people face a state pension shortfall. The impacted party includes the lowest paid workers in the UK. While the backlog results from a delayed system that itself cost tax payers millions of pounds, the additional loss will be borne by individuals and only count as a hidden backlog indirectly stemming from another failure. The true cost to individuals is likely to be £15 billion and the hardship that ensues as a result [BBC 2003].

2.2 Difficulty in understanding failures

The figures quoted above refer to failed projects which were never delivered, as well as challenged projects which exceed their cost and time baselines. This introduces a distinction between total failure (say a system that is delivered but is never used) and a partial failure or a challenged project. (Projects which finish late and over-budget and with lower functionality than originally expected can be called challenged.) Note however that late delivery in certain situations may constitute an outright failure, and cancellation may be a positive outcome for a project that has dragged on indefinitely.

Lyytinen and Hirschheim [1987] identified four categories of failed IS projects:

1. Correspondence failure: When the requirements are not met.
2. Process failure: When the project runs over time or budget and performance is unsatisfactory.
3. Interaction failure: If there are problems related to the use the system or when it is hardly used.
4. Expectation failure: A superset of the above three types of failures, when stakeholders' expectations cannot be met.

It is clear that failures can be on different levels with many factors that need to be taken into account when they are studied. The information that is gathered to gain evidence can become more embedded in other domains and then the impact and scope of the failures become wider reaching [Fortune and Peters 1995]. The year 2000 problem is an example of this wider reaching impact. Similarly, the Inland Revenue failure described above has had wider reaching impact, spanning a third of the workforce in the United Kingdom.

Evidence collection as part of failure investigation is a primary activity. Evidence can be obtained from a variety of sources including interviews, direct observation, and different types of documentation e.g. surveys, minutes from meetings, journalistic descriptions, reports of investigative committees, eyewitness accounts, etc. The main problem however is that the researcher gets the information *after* the incident and most of the sources are already in place when the failure is studied. The researchers must therefore rely on analysing what came before without the ability to plan for data gathering. It also means that researchers are faced with biases related to the position of the interviewee in relation

to outcome. The aim of researchers in this area is to conduct a forensic investigation using the information from a variety of different sources whilst also taking into account the environment, context, people and the interactions between subsystems. The rich variety of sources introduces a challenge but also provides a mechanism for verifying and cross-referencing the differing accounts and perspectives.

When such information is gathered and investigated, the main method of presenting the findings is through the publication of a case study. According to Lyytinen and Hirschheim [1987] more qualitative research methods are needed for IS failure research.

Donaldson and Jenkins [2001] ask the question ‘why is there such a problem when so much is known about failures?’ They come to the conclusion that although much has been written about the topic, there is not a lot of ‘work-in progress’ that is being researched or reported on. The same authors [2000] also report in current research efforts focusing on systems failures. The UK, USA, Denmark and Sweden are reported to have active research communities; however, they seem to face a similar need for better methods to understand failures and to learn from such experiences [ibid.]. Sixteen years after the observations of Lyytinen and Hirschheim, it still seems that the situation has not improved dramatically.

Although much is known about the reasons for systems failures it appears that not enough is done to feed the symptoms and the gained knowledge back to the discipline in order to try to learn from past events. A typical set of common characteristics for failures reproduced from Evans et al [2001] appears below:

- Failure to apply essential project management practices
- Unrealistic management expectations and unwarranted optimism
- Effective software practices not implemented
- Premature declarations of victory
- A lack of program management leadership
- Decision-making that is untimely
- A lack of pro-active risk management

Most project managers will be familiar with the symptoms. So, if the above list is known (and many more similar factors have been identified elsewhere) – how can we make better sense of failures and use the complex information gathered from different stakeholders to gain knowledge for future projects? The choice of research methods is important and is coupled to the type of information that is available to the researcher [Dalcher 2003]. Quantitative methods will less likely be used, because not much reliable, objective measurable information is available.

A failure has many facets; it is complex with multiple causes and perspectives [Lyytinen and Hirschheim 1987]. It is of great importance that the interactions and actions of humans be studied and the conventional positivistic norm is not suitable for meaning-rich contextual work. Qualitative approaches for understanding failures are better suited since they enable the researcher to take account of context, perspective and intention. Each failure is different and it will not be possible to get one ultimate method of studying all failures. Moreover, the dynamic nature of complex interactions must play a leading role in the investigation process.

The aim of forensic investigation is to use available evidence and information to explain a given failure. The researcher wants to understand failures, their background and how they come about [Dalcher 1997]. With such understanding, new insights can be generated and fed back to the discipline (possibly through an improved body of knowledge) thereby leading to improvement in organisational processes. Having described the complications in studying failures the next section will look at the case study as a research tool in Information Systems forensics (IS forensics).

3. USING CASE STUDIES TO DESCRIBE THE FAILURE STORY

A common way of looking at failures is through the use of case studies. Case studies can be used as an educational tool, as well as a research tool for evidence collection. Yin [1993] states that a case study is an empirical enquiry that:

‘investigates a contemporary phenomenon within its real life context, when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used’.

The aim of the case study is to give a rich, multidimensional picture of a situation that is being studied, that incorporates relationships, political issues and the rich context in which the study is carried out [Remenyi et al 2002]. Remenyi also offers a comprehensive description of case studies and how they can be used in the area of evidence collection as an effective research tool.

According to Dalcher [2003] the main advantages of using case studies include:

- Ability to identify issues and then focus on them
- Richness of detail
- Taking into account multiple perspectives and explanations
- Cross-disciplinary remit
- Ability to recognise inherent complexity and minimize it

- Ability to handle disagreement
- Ability to show interactions
- Ability to see emerging patterns
- Ability to see the context of the problem
- Dealing with interpretations
- The inclusion of wider aspects of the system environment

There are also objections to the use of case studies:

- Data is viewed as ‘soft’
- Biases present in views
- Questions about generalisation of findings for a single case
- Issues regarding objectivity
- Negotiating access to the setting
- Boundaries can be difficult to define
- Mainly after the fact – retrospective
- Time – may take too long
- Reliability of the conclusions

Although there are objections to their use, case studies are ideal for studying interactions between people and their understanding of a situation in context.

The Software Forensics Center at Middlesex University proposes the use of the term *case history* [Dalcher 2003] because the failure is investigated after the event. The *case history* is then the main tool in the hand of the researcher representing a detailed description and analysis of complex events and processes. Case histories must incorporate more than a simple chronology of events – they convey a story taking into account different perspectives, focuses and biases. Constructing a convincing narrative after the fact is a key challenge. 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. Failure storytelling can be understood as a narrative recounting with the unlocking of patterns or a plot.

To construct a plot is to give a voice to the narrator and the key stakeholders. The researcher wants to construct the story so to get as output valid research findings. There must be trust between the researcher and the storytellers because they can reveal private and subjective detail. Care must be taken to deal with personal biases and follow-up questions must clarify context and sequence so as to make sense of the overall story.

The process of constructing the narrative has to do with perspectives, purpose of participants, plausibility of the emerging plot and the filtering of irrelevant information. Researchers must try to interpret stories and use information in such a way that valid research findings can be produced. Understanding IS failures is a complex activity and it is not just the construction a narrative from a simplistic chronology of events. Narrative inquiry is used in the social and management research sciences as an acceptable research approach [Boje 2001, Bell 1999]. The research question that drives the research reported in this paper, is, could it also be utilized in the studying of IS failures? The next section will look into narrative and antenarrative methods for organisational research.

4. NARRATIVE AND ANTENARRATIVE METHODS

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. Generally, there is a variety of methods for dealing with complex narratives. Indeed, a main challenge for researchers of complex phenomena is what to do when there is a multiplicity of versions and narratives rather a single and well-understood version that is shared by participants. Understanding failures often entails the retrospective untangling of complicated webs of actions and events and emergent interaction patterns.

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. [2002] contend that a story, or a narrative description, is valid if the resulting narrative adds some knowledge.

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]. 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.

Understanding IS failures is therefore more complicated than the discovery of a simplistic chronology of events.

The reality in failure stories is of multi-stranded stories of experiences and reactions that lack collective consensus. The story format provides a powerful way of knowing and linking disparate accounts and perspectives. Stories 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. It also means that researchers need to find ways of reconciling and fitting these stories together in an effort to make sense of the world.

Boje [2001] advocates in his book on narratives the use of ‘antenarrative’ methods to take into account that stories appear to be told improperly: in a fragmented, multi-plotted and complex manner. He sets out eight antenarrative analysis options that can deal with fragmented and polyphonic storytelling. The research question that is now asked is: can the use of narrative and antenarrative analysis help this field of failure research to get a more complete understanding of complex interactions. Boje [2001] defines antenarrative as ‘this fragmented, non-linear, incoherent, collective, unplotted and improper storytelling’ that is the story in an *ante* state of affairs before a constructed narrative is used to impose sense.

Boje [2001] describes eight alternative narrative analysis or antenarrative approaches. Each will be discussed briefly. The methods are:

1. Deconstruction
2. Grand narrative
3. Microstoria
4. Story network
5. Intertextuality
6. Causality
7. Plot
8. Theme

4.1 Deconstruction

When evidence is collected it is clear that every story: has a worldview, is part of other stories or events and has another side. Deconstruction challenges the researcher with linearity, sequence, voice and plot.

4.2 Grand narrative

When stories are analysed it is important that grand narratives must be looked into and see how many smaller stories exist within. Each story is an intertextual network. Other voices can be embedded in the grand narrative.

4.3 Microstoria

Researchers using this approach use the ‘little people’s’ histories and ignore the ‘great man’ accounts that are most often used in organisation studies. Microstoria relies upon archival evidence found in notary records, property registries, pamphlets, trial proceedings, etc. Clues from non-elite persons and places are used and exceptional cases are used.

4.4 Story network

In antenarrative analysis the researcher tries to trace the storytelling behaviour in the organising situation. The organisation is seen as a storytelling system.

4.5 Intertextuality

This approach is not used much in organisation studies. Intertextuality is the dialogue that goes on between and in narratives. Many voices contribute to the stories that need to be analysed.

4.6 Causality

The casual field to work in is often messy and complex. This approach looks into how people put fragments of story together into causal assertion.

4.7 Plot

Who gets to author the narrative in emplotment of complex organisations? Are other emplotments feasible? The readers and writers of a plot must get into intertextual dialogue.

4.8 Theme

Storytelling moves beyond the limits of hierarchy and classification. The researcher focuses on what was between the lines and what was left out.

The alternative ways that Boje [2001] has assembled mainly focus on multi-stranded stories of experiences that lack collective consensus. The next stage of our research will focus on their utility in reasoning about (and explaining) software development failures. Can these or other methods be used to conduct comprehensive IS failure analysis so that the software development community can begin to learn from past mistakes? Are some methods more suitable than

others in a specific organisation culture, for a specific type of application, etc? The research effort that will be conducted will attempt to try and answer some these questions.

5. 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 presented some aspects of the IS failure research field. It was shown that failures result in a cost burden borne by society. Moreover, they have been with mankind for a few decades now. Much research has been done on the reasons for failures but it seems that new and alternative ways of studying the failure phenomena must be looked into. This paper reports on current research in progress. A few of the methods described by Boje [2001] were introduced here.

The research project will attempt to look into these, and possibly other methods, and investigate how they can be applied in the analysis of IS failures in an effort to improve our understanding of failure phenomena. The frequency scale of reported failures is increasingly used to draw attention to the problems associated with the practice of information systems development. Hopefully, some of the methods described here will play a part in aiding the understanding of such failures and in documenting the details that describe how failures come about as a first step towards searching for new solutions. Developing countries will then be able to learn from these experiences so as to make the best use of their precious resources.

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