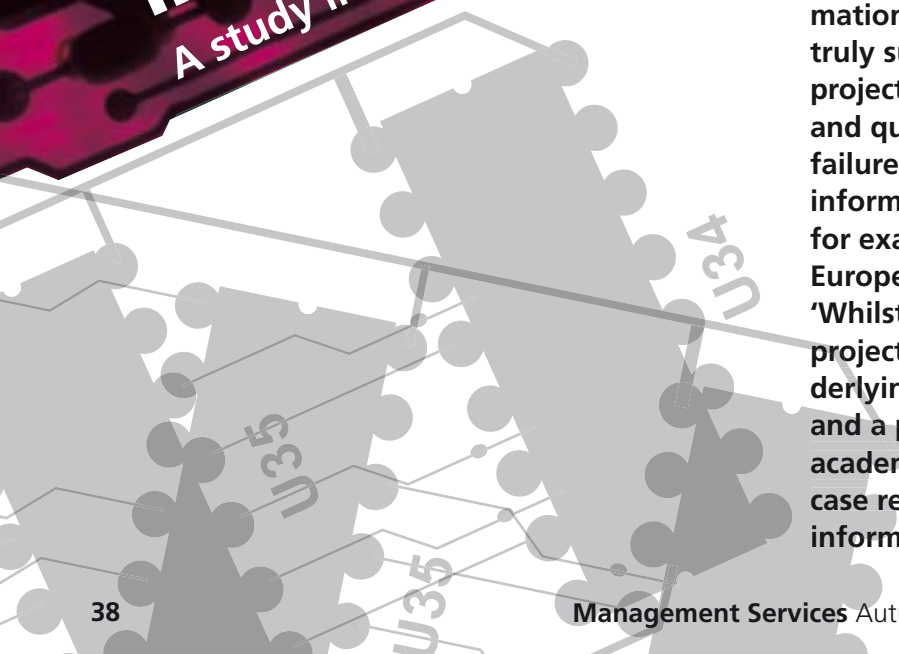
Understanding the Sources of Information Systems Project Failure

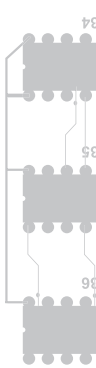
A study in IS project failure

By Dr John McManus and Professor Trevor Wood-Harper

Abstract

Previous research undertaken by the authors in 2002 highlights that only one in eight information technology projects can be considered truly successful (failure being described as those projects that do not meet the original time, cost and quality requirements criteria). Despite such failures, huge sums continue to be invested in information systems projects and written off, for example the cost of project failure across the European Union was 142 billion Euros in 2004. 'Whilst our understanding of the importance of project failure has increased, many of the underlying reasons for failure still remain an issue and a point of contention for practitioners and academics alike. This paper examines through case research some of issues and casual factors of information systems project failure.





Management issues accounted for 65% of causal factors identified with failed projects

Introduction

A predominant paradigm in information systems project management is to view the development and delivery process as a three way trade-off between time, (business urgency), Cost (budget) and quality (product functionality or capability). This paradigm both influences and promotes trade-offs between product functionality, cost and schedule. Trade-offs are mitigated or eliminated entirely through arbitrage or negotiation and despite attempts to make software development and project delivery more rigorous, a considerable proportion of delivery effort results in systems that do not meet expectation and fail to meet user expectations.

Previous research and writings by McManus [4 5] suggest that project management in many software engineering firms currently ranges from undisciplined to chaotic. Few organisations have the infrastructure, education, training, or management discipline to bring projects to successful completion. Research [6 7 8] indicates that more than half of all information technology projects become runaways – overshooting their budgets and timetables while failing to deliver on their goals. The seemingly high level of project failures tied to the time, cost and quality paradigm (frequently reported in the news and professional press) is the motivation for this research, being informed by previous studies into project failure for example, the seminal work undertaken by the Standish Group International, Chaos Report in 1995, [7] and the literature on information systems and the author's own published works and experience in information systems development and project management [1].

Prior research

Prior research by the authors [3] highlights a number of critical causal factors in failed projects. Findings from this earlier research were based on 42 information systems (IS) projects that were completed in the period 1994-2001. These earlier findings included inadequacies in management and technical practices. Management issues accounted for 65% of causal factors identified with failed projects [1 3].

Management causal factors account for 65% of the project failure rate

- Poor leadership in project delivery
- Poor stakeholder communication
- Poor competencies (and skill shortages)
- Poor stakeholder management
- Poor estimation methods
- Poor risk management
- Insufficient management support

Technical causal factors account for 35% of the project failure rate

- Inappropriate and ill defined software requirements
- Inappropriate technical designs
- Inappropriate development tools
- Inappropriate user documentation
- Poor test planning
- Poor technical support

One of the key findings from this earlier research was the lack of stakeholder communication and the need to pass on business and technical knowledge within project community and within the wider management hierarchy. The importance of continuous feedback to each of the participating stakeholders cannot be stressed enough. In particular, details of any mistakes made should be shared with the project community. Based on our analysis of the post implementation audits, there appears a broad consensus that mistakes are acceptable but failure is not. Failure was considered an absolute error that could not be recovered from. It was therefore concluded that success was in fact largely dependent on creating contingency plans and alternate approaches for projects that have a high perceived risk coefficient [1].

This research programme

Adopted methodology

It could be argued that the way research is conducted may be conceived in terms of: the research philosophy subscribed to, the

research method employed and the research instruments used in pursuit of the research objective. In the authors view research philosophy may be described as a construct about the way in which data (or information) should be gathered, analysed and used. Research should exhibit both rigour and relevance. The issue of what research approach and methodology might be relevant to information systems project failure has been vastly debated. Earlier research by the authors was undertaken using a 'case' based approach (since much of the material examined came from a single entity systems integration practice). The main attributes of this case based approach may be defined as:

- Researcher as observer;
- Exploratory, explanatory or descriptive;
- Focus on 'How?' and 'Why?'.

Given the complexity of the subject area and the need to build on earlier research and to broaden the horizon an approach based on cases and surveys was deemed applicable. The surveys looked at different projects (and their team structures) at the same time, interviews were conducted with a selective number of project managers to follow up issues or clarify points of interest. In this study a larger amount of data was analysed than the earlier cases. More consideration was given to identifying sample projects (through literature reviews) and identifying the key attributes for data analysis. The period of analysis covered 1998-2005 the number of information systems projects examined across the European Community was 214 comprised of both public and private sector firms that included 63 projects from the public sector and 151 projects from the private sector (refer to tables 1 and 2 for breakdown by sector and project value).

Validity of research

When assuring the validity of information, it is always advisable to use different techniques to authenticate the substance and accuracy of the data and information used. In this respect triangulation was seen as a possible use for this purpose. Triangulation was used as a secondary source of information (eg to support an interview with data from a project). By undertaking this activity it was possible to find differences between what people said and what they did (ie, what they undertook).

Practical outcomes

One practical outcome envisaged from this research activity is

Table 1 Number of IS projects examined within European Community

Rank	Sector	Number of Projects Examined
1	Manufacturing	43
2	Retail	36
3	Financial Services	33
4	Transport	27
5	Health	18
6	Education	17
7	Defence	13
8	Construction	12
9	Logistics	9
10	Agriculture	6
	Total	214

Table 2 Project value in millions of Euros

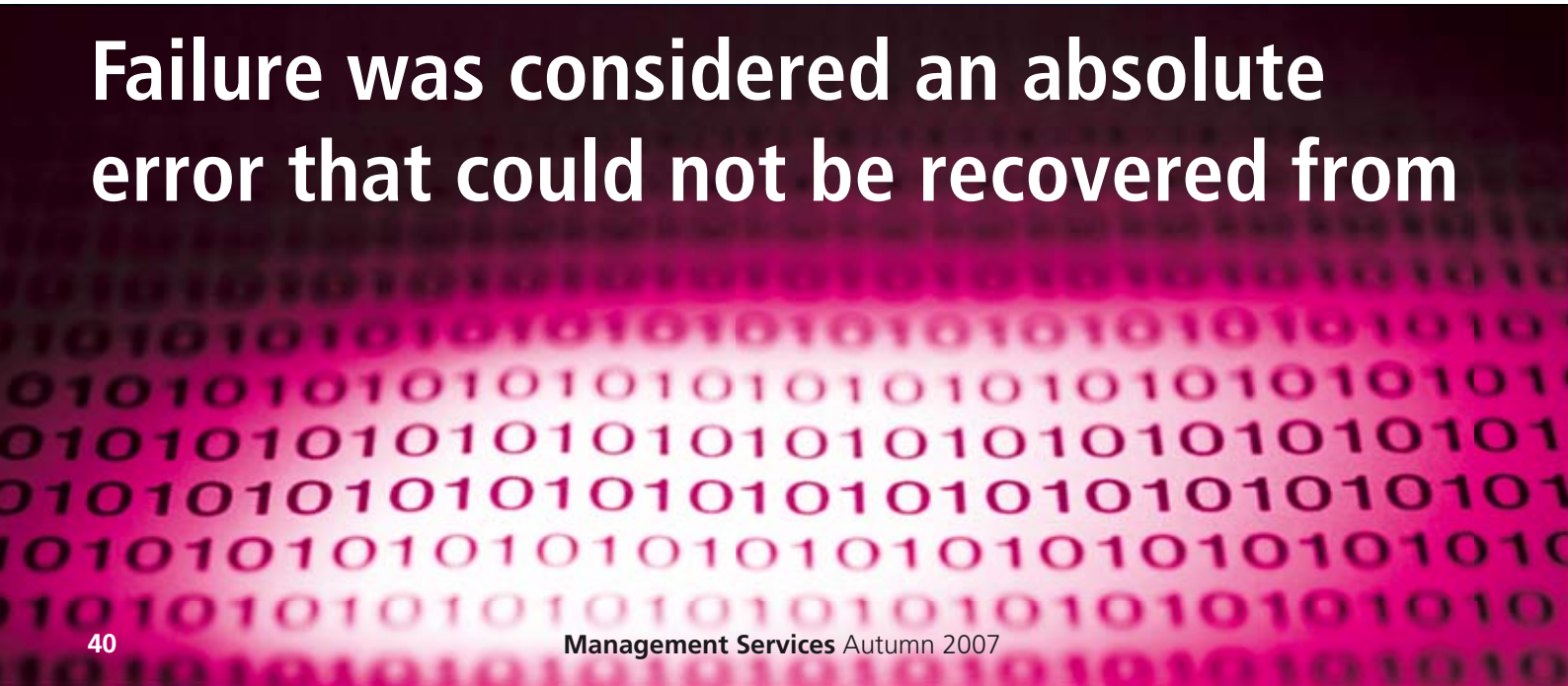
Value range in millions Euros	Number of Projects	Percentage (%)	Accumulative (%)
0 – 1	51	23.831	23.831
1 – 2	20	9.346	33.177
2 – 3	11	5.140	38.317
3 – 5	33	15.421	53.738
5 – 10	4	1.869	55.607
10 – 20	87	40.654	96.261
20 – 50	6	2.804	99.065
50 – 80	2	0.935	100.000
Totals	214	100.00	100.000

a continuing debate amongst academics and practitioners in essence paving the way for new areas of study in relation to information systems project failure. The research should also provide an increased understanding of why information systems projects continue to fail.

Research questions and data analysis

This research builds on previous research undertaken and although by no means exhaustive this research aims to find answers to three questions. Namely:

1. At what stage in the project lifecycle are projects cancelled (or abandoned as failures)?
2. What is the average schedule and budget overrun?
3. What are the major causal factors contributing to failure?



One notable causal factor in abandonments was the lack of due diligence at the requirements phase

Question 1

At what stage in the project lifecycle are projects cancelled (or abandoned as failures)?

When undertaking software development a number of different approaches and methodologies can be used however, the most common method in use is the waterfall method [3]. It is also acknowledged that other approaches (eg DSDM, RAD, and Agile methods) could also be used in parallel with the waterfall method. Prior research by the authors [3] identified that 7 out of 10 software projects undertaken in the UK adopted the waterfall method for software development and delivery. Although some of the projects analysed did use a mixture of software development methods through a process of normalisation the authors were able to overlay all 214 projects onto the lifecycle outlined in table 3.

Results from the analysis of cases indicates that almost one in four of the projects examined were abandoned after the feasibility stage. Of those projects completed approximately one in three were schedule and budget overruns.

Table 3 Project completions, cancellations and overruns

Waterfall method lifecycle stage	Number of projects cancelled	Number of projects completed	Number of projects overrun (schedule and/or cost)
Feasibility	None	214	None
Requirements analysis	3	211	None
Design	28	183	32
Code	15	168	57
Testing	4	164	57
Implementation	1	163	69
Handover	None	163	69
Percentages	23.8%	76.2%	

Reasons for project cancellations

Of the initial 214 projects studied 51 (23.8% were cancelled) – a summary of the principal reasons why projects were cancelled is given in Table 4. Earlier research by the Standish Group found that 31% of projects were deemed failures and were subsequently cancelled [7]. Although this research is based on a much smaller sample than the Standish Group work the two samples are nevertheless within acceptable standard deviations of each other. Results from this analysis indicate that the cancellation of projects (23.8%) can be attributed to a combination of factors that included the following (from Table 4):

1 Business process alignment;
2. Poor requirements management;
3. Business benefits overstated;
4. Differences between management and client;
5. Lack of management judgement (leadership);
6. Insufficient domain knowledge;
7. Loss of key personnel;
8. Poor communication with stakeholders;
9. Poor systems integration;
10. Poor change management procedures.

Our earlier research [3] elaborated on the symptoms of information systems project failure in three specific areas: frequent requests by users to change the system; insufficient communication between the different members of the team working on the project and the end users (stakeholders); and no clear requirements definitions. Whilst communication between team and end users was still perceived as an issue within some projects; the top three issues from this study are: business process alignment; requirements management; and overspends. For example, the compatibility of the systems under development were in 28 instances found to be so far adrift from the core business processes that the projects were abandoned at a cost of tens of millions euros.

One notable causal factor in these abandonments was the lack of due diligence at the requirements phase, an important factor here was the level of skill in design and poor management judgement in selecting software engineers with the right skill sets. Equally the authors found some evidence in poor tool set selection in that end users found it difficult to sign-off design work – in that they could not relate process and data model output with their reality and practical knowledge of the business processes.

Question 2

What is the average schedule and budget overrun?

In examining the cases it was noted that the average duration of a project was just over 26 months (115 weeks) and the average budget was approximate 6 million euros, (Table 5). In many instances information on a project being over schedule and over budget will force senior management to act, however,

Table 4 Key reasons why projects get cancelled (N=51)

Business reasons (N = 10)	Management reasons (N = 27)	Technical reasons (N = 14)
19.6%	53.0%	27.4%
• Business strategy superseded	• Ability to adapt to new resource combinations	• Inappropriate architecture
• Business processes change (poor alignment)	• Differences between management and client	• Insufficient reuse of existing technical objects
• Poor requirements management	• Insufficient risk management	• Inappropriate testing tools
• Business benefits not clearly communicated or overstated	• Insufficient end-user management	• Inappropriate coding language
• Failure of parent company to deliver	• Insufficient domain knowledge	• Inappropriate technical methodologies
• Governance issues within the contract	• Insufficient software metrics	• Lack of formal technical standards
• Higher cost of capital	• Insufficient training of users	• Lack of technical innovation (obsolescence)
• Inability to provide investment capital	• Inappropriate procedures and routines	• Misstatement of technical risk
• Inappropriate disaster recovery	• Lack of management judgement	• Obsolescence of technology
• Misuse of financial resources	• Lack of software development metrics	• Poor interface specifications
• Overspends in excess of agreed budgets	• Loss of key personnel	• Poor quality code
• Poor project board composition	• Managing legacy replacement	• Poor systems testing
• Take-over of client firm	• Poor vendor management	• Poor data migration
• Too big a project portfolio	• Poor software productivity	• Poor systems integration
	• Poor communication between stakeholders	• Poor configuration management
	• Poor contract management	• Poor change management procedures
	• Poor financial management	• Poor technical judgement
	• Project management capability	
	• Poor delegation and decision making	
	• Unfilled promises to users and other stakeholders	

the search for the underlying factors should begin elsewhere in the projects history [9]. The pattern that emerges from a synthesis of case data is complex and multifaceted. In a few of the of cases examined the project commentary and history was ambiguous; however, once a decision had been made to support a project which was over schedule or over budget the ends usually justified the means irrespective of the viewpoints of individual project managers or stakeholders. For example, one project undertaken within the financial services sector involved the design, build and implementation of a share dealer system for hundreds of bond brokers and other support staff which involved a multi-layer stakeholder community.

On completion of the project both the client and project managers regarded the project as a success. There were, however, a number of design and implementation problems that, with hindsight, could have been avoided. The client and senior management felt that the project was a success, although it was 20 weeks late and was 56% over budget. This was a good result based on client's previous track record in information systems delivery.

In projects over six million euros, the understatement of

Table 5 Cost and schedule overruns (N=69)

Projects From Sample	2 (2)	11 (13)	19 (32)	25 (57)	12 (69)
Schedule Overrun	11 weeks	29 weeks	46 weeks	80 weeks	103 weeks
Range	Average Budget + 10%	Average Budget + 25%	Average Budget + 40%	Average Budget + 70%	Average Budget + 90%
Cost Overrun	600,000 Euros	1,500,000 Euros	2,400,000 Euros	4,200,000 Euros	5,400,000 Euros

effort, stakeholder and project management costs appeared to be a common feature and small budget overruns (less than 10%) did not generally reflect the cost or risk of the project. The fact that it took an additional 20 weeks and extra support and user personnel to iron out post-implementation problems 'was initially hidden' without too many problems, the important thing for the project manager and the senior management team was that the project could be held up as a success.

Question 3

What are the major causal factors contributing to project failure?

Judgements by project stakeholders about the relative success or failure of projects tend to be made early in the projects life cycle. On examination of the project stage reports it became apparent that many project managers plan for failure rather than success. As one project manager commented …"it seems to me one of the enduring problems in the organisation on these issues (project delivery) has been that, although there are a large number of very talented people in the organisation, I do not think it has had a sufficient depth of expertise on the very complicated range of technical issues, operational issues and market issues which are required to see the project through to a satisfactory and timely conclusion' [10].

When analysing success and failure, it is second nature to ascribe 'cause and effect to events' [1]. For example, the system went live more or less on time because the project was well-managed (with a highly respected project manager) or was late because system testing was not thorough enough. The idea of causality or the relationship between 'cause and event' is central to many conceptions of theory [11]. When theory is taken to involve explanation and understanding, it is intimately linked to ideas of causation. Often, to ask for an explanation of an 'event' is to ask for its cause. Similarly, the ability to make predictions from theory can depend on knowledge of causal connections. For example, the knowledge that stakeholders (that is users) involvement contributes to the development of 'successful' information systems warrants the inference that if stakeholders are not involved in the development of a particular system then the system is less likely to be successful. This is emphasised in the following case.

During the implementation phase of one project studied the sponsoring organisation was undergoing a major reorganisation and was attempting to downsize some of its operations. The next 18 months were typified by intense political power struggles as the senior management team attempted to position themselves within the organisation. From the project manager's perspective it seemed that the personal ambitions of the managers played a significant part in how the organisation would be structured and this influenced significant strategic decisions. Outcomes were legitimised in language that drew upon the business urgency, market pressures and customer

One of the major weaknesses uncovered during the analysis was the total reliance placed on methodologies

service etc. It is, however, difficult to ignore the personal and organisational politics (risk) that bubble away continuously in the background, and if the management require a software project to fail, then, by and large, they could bring this outcome about. Similarly, if they wanted it to succeed then to a large extent they could also bring about this outcome.

If we consider the inherent complexity of 'risk' associated with software project delivery it is not too surprising that only a small number of projects are delivered to the original time, cost and quality requirements. Our evidence suggests that the culture within many organisations is often such that leadership, stakeholder and risk management issues are not factored into projects early on and, in many instances, cannot formally be written down for political reasons and are rarely discussed openly at project board or steering group meetings although they may be discussed at length behind closed doors.

A predominant paradigm in information systems project management is to view the development process as a three way trade-off between time, (business urgency), Cost (budget) and quality (product functionality and capability) [3]. This view sees product functionality, cost and time as issues to be traded-off. Significant trade-offs are mitigated or eliminated entirely through a process of arbitrage or negotiation. Despite attempts to make software development and project delivery more rigorous, a considerable proportion of delivery effort results in systems that do not meet user expectations and are subsequently cancelled (Table 3). In our view this is attributed to the fact that very few organisations have the infrastructure, education, training or management discipline to bring projects to successful completion. One of the major weaknesses uncovered during the analysis was the total reliance placed on methodologies. It could be argued that following a project methodology, such as PRINCE2 helps project managers and those involved in organising and delivering software projects and structured methodologies such as SSADM help developers in design and other technical activities but methods can become an almost immaterial factor in the face of stakeholder and personal politics. From experience of case study research into the implementation of SSADM, Wastell comments…"Methodology becomes a fetish, a procedure used with pathological rigidity for its sake, not as a means to an end. Used in this way, methodology provides relief against anxiety; it insulates the practitioner from risks and uncertainties of real engagement with people and problems"[12]. One explanation for the reliance on methodology is the absence of leadership within the delivery process. Processes alone are far from enough to cover the complexity and human aspects of many large projects subject to multiple stakeholders, resource and ethical constraints. The basis for developing and delivering information systems will require an extension of the discipline that is project management to provide capabilities and understanding in the interrelationships between leadership, stakeholder and risk management. The major challenge is to extend our understanding and capabilities within this domain so that it is possible to address the issues in information systems project failure.

Conclusions

Although our understanding of the importance of project failure has increased, the underlying reasons still remain an issue and a point of contention for both practitioners and academics alike. Without doubt there is still a lot to learn from studying project failure. As previously specified project management is intrinsically tied to the time, cost, quality paradigm and projects that are challenged are typically forced to make trade-offs in budget, time estimates, features and functions (quality). Such trade-offs lead to escalation in which key personnel are pitted against each other. Going back to the research undertaken there is little evidence that the issues of project failure outlined in table 4 have been fully addressed within information systems project management. Based on this research project failure requires recognition of the influence multiple stakeholders have on projects, and a broad based view of project leadership and stakeholder management. Developing an alternative methodology for project management founded on a leadership, stakeholder and risk management should lead to a better understanding of the management issues that may contribute to the successful delivery of information systems projects.

References

1 McManus, J, (2004), *Risk Management in Software Development Projects*, Elsevier, Butterworth-Heinemann, Oxford, UK.

2 McManus, J, (2004), *A Stakeholder Perspective within Software Engineering*, Innovation and Entrepreneurship for Sustainable Development, Proceedings of the IEEE Transaction International Engineering Management Conference, 18-21 October, Singapore, Vol 2, pp 880-884.

3 McManus, J and Wood-Harper, T, (2003), *Information Systems Project Management: Methods, Tools and Techniques*, Pearson Education, Prentice Hall, UK, pages 4, 5, 9-10, 207-10, & 228.

4 McManus, J, (2003) *The Application of Risk Planning in Software Development Projects*, Management, Journal Management Services, pp16-18, June.

5 McManus, J, (2002), *The Influence of Stakeholder Values on Project Management*, Journal Management Services, pp 8-15, June.

6 Gibbs, W W, (1994), *Software's Chronic Crisis*, Scientific American, September, pp. 86–95.

7 Standish Group International, (January, 1995), *CHAOS: application project failure*, Report, Standish Group International.

8 KPMG Canada, (October, 1997), *What Went Wrong? Unsuccessful Information Technology Projects*, (see: www.kpmg.com).

9 Ewusi-Mensah, K, (1997), *Critical Issues in Abandoned Information Systems Development Projects*, Communications of the ACM, Vol 40, No 9.

10 McManus, J, (2005), *Managing Stakeholders in Software Development Projects*, Elsevier, Butterworth-Heinemann, Oxford, UK

11 Gregor, S, (2002), *A theory of theories in information systems*, in S Gregor, and D Hart (Eds), Information Systems Foundations: Building the theoretical base, Australian National University, Canberra, p 5.

12 Wastell, D, (1996), *The Fetish of Technique: methodology as a social defence*, Information Systems Journal, 6, p 34.